BAE SYSTEMS

# APPENDIX MANUAL

# FOR THE

# WJ-8615 SERIES VHF/UHF RECEIVER

P/N 181482-001, Revision D

# APPENDIX MANUAL

# FOR THE

# WJ-8615 SERIES VHF/UHF RECEIVER

**P/N 181482-001, Revision D**

**Copyright © BAE SYSTEMS 1990**
**All Rights Reserved**

**BAE SYSTEMS**
**ADVANCED SYSTEMS**
**700 QUINCE ORCHARD ROAD**
**GAITHERSBURG, MARYLAND 20878-1794**

March 2001

## WARNING

This equipment utilizes voltages which are potentially dangerous and may be fatal if contacted. Exercise extreme caution when working with the equipment with any protective cover removed.

## PROPRIETARY STATEMENT

This document and subject matter disclosed herein are proprietary items to which BAE SYSTEMS retains the exclusive right of dissemination, reproduction, manufacture and sale.

This document is provided to the individual or using organization for their use alone in the direct support of the associated equipment unless permission for further disclosure is expressly granted in writing.

## EXPORT STATEMENT

The technical data contained in this document is controlled for export by the U.S. Department of State under the International Traffic in Arms Regulations. It may not be re-exported, transferred or diverted to any other end-user or any other end-use without the prior written approval of the Office of Defense Trade Controls.

## WARRANTY

Seller warrants for a period of one year from the date of shipment, unless a different period has been agreed upon and incorporated into the Contract, that the products delivered or services rendered will conform to the specifications and be free from defects in workmanship and materials. THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF MERCHANTABILITY, FITNESS FOR PURPOSE, OR OTHER WARRANTIES OR GUARANTIES OF ANY KIND OR DESCRIPTION, WHETHER STATUTORY, EXPRESS, OR IMPLIED. If the goods delivered or services performed fail to conform to the warranty stated in this clause, Seller will correct the nonconformity at its expense by such repair, adjustment, modification, or replacement of the goods or services as Seller deems expedient. THE FOREGOING REMEDY OF BUYER FOR ANY FAILURE OF THE GOODS OR SERVICES TO MEET ANY WARRANTY IS EXCLUSIVE. BUYER EXPRESSLY AGREES THAT THE LIABILITY OF SELLER UNDER ANY WARRANTY SHALL NOT INCLUDE DAMAGE TO OUR LOSS OF PROPERTY OTHER THAN THE GOODS COVERED BY THE CONTRACT; LOSS OF PROFITS OR REVENUE; INCREASED COSTS OF ANY KIND; CLAIMS OF CUSTOMERS OF BUYER; OR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES. As to goods or components where the customer has funded the repair, Seller will warrant as limited above, the repaired portion of the unit for three months from the date of reshipment. EQUIPMENT OR PARTS DESCRIBED AS BEING MANUFACTURED BY OTHERS ARE SOLD BY SELLER AS IS and Buyer must look to the respective manufacturer for any and all claims with regard to said equipment or parts.

## LIST OF EFFECTIVE PAGES

| Page Number | Description | Revision |
|---|---|---|
| i | Cover | D |
| ii | Proprietary Statement | D |
| iii thru vi | List of Effective Pages | D |
| vii | Revision Record | D |
| viii | Intentionally Blank | B |
| ix | Table of Contents | B |
| x | Intentionally Blank | B |
| 1-1 | Section One Page | B |
| 1-2 | Section One Page | B |
| A-i | Appendix A Cover | D |
| A-ii | Proprietary Statement | D |
| A-iii | Table of Contents | C |
| A-iv | Intentionally Blank | C |
| A-1 thru A-4 | Appendix A Pages | B |
| B-i | Appendix B Cover | D |
| B-ii | Proprietary Statement | D |
| B-iii | Table of Contents | D |
| B-iv | Table of Contents | D |
| B-0 thru B-4 | Appendix B Pages | B |
| B-5 | Appendix B Page | C |
| B-6 thru B-8 | Appendix B Pages | B |
| B-9 thru B-34 | Appendix B Pages | D |
| FP-B-1/(FP-B-2 blank) | Schematic | D |
| FP-B-3/(FP-B-4 blank) | Schematic | D |
| FP-B-5/(FP-B-6 blank) | Schematic | D |
| FP-B-7/(FP-B-8 blank) | Schematic | D |
| FP-B-9/(FP-B-10 blank) | Schematic | D |
| FP-B-11/(FP-B-12 blank) | Schematic | D |
| FP-B-13/(FP-B-14 blank) | Schematic | D |
| C-i | Appendix C Cover | D |
| C-ii | Proprietary Statement | D |
| C-iii | Table of Contents | D |
| C-iv | Intentionally Blank | C |
| C-1 thru C-3 | Appendix C Pages | B |
| C-4 thru C-10 | Appendix C Pages | D |
| FP-C-1 thru FP-C-2 | Schematic | D |
| D-i | Appendix D Cover | D |
| D-ii | Proprietary Statement | D |
| D-iii | Table of Contents | D |
| D-iv | Table of Contents | D |
| D-1 thru D-3 | Appendix D Pages | B |
| D-4 thru D-5 | Appendix D Pages | C |
| D-6 thru D-8 | Appendix D Pages | D |
| D-9 | Appendix D Page | C |

## LIST OF EFFECTIVE PAGES (Continued)

| Page Number | Description | Revision |
|---|---|---|
| D-10 | Appendix D Pages | D |
| D-11 thru D-12 | Appendix D Pages | C |
| D-13 thru D-19 | Appendix D Pages | D |
| D-20 thru D-21 | Appendix D Pages | C |
| D-22 | Appendix D Page | D |
| D-23 thru D-24 | Appendix D Pages | C |
| D-25 thru D-26 | Appendix D Pages | D |
| D-27 | Appendix D Page | C |
| D-28 thru D-29 | Appendix D Pages | D |
| D-30 | Appendix D Page | C |
| D-31 thru D-32 | Appendix D Pages | D |
| FP-D-1/(FP-D-2 blank) | Schematic | D |
| FP-D-3/(FP-D-4 blank) | Schematic | D |
| FP-D-5/(FP-D-6 blank) | Schematic | D |
| FP-D-7/(FP-D-8 blank) | Schematic | D |
| FP-D-9/(FP-D-10 blank) | Schematic | D |
| FP-D-11/(FP-D-12 blank) | Schematic | D |
| FP-D-13/(FP-D-14 blank) | Schematic | D |
| E-i | Appendix E Cover | D |
| E-ii | Proprietary Statement | D |
| E-iii | Table of Contents | D |
| E-iv | Intentionally Blank | C |
| E-1 | Appendix E Page | B |
| E-2 | Appendix E Page | D |
| E-3 thru E-4 | Appendix E Pages | B |
| E-5 thru E-6 | Appendix E Pages | D |
| E-7 thru E-8 | Appendix E Pages | B |
| FP-E-1/(FP-E-2 blank) | Schematic | D |
| F-i | Appendix F Cover | B |
| F-ii | Proprietary Statement | B |
| F-iii | Table of Contents | C |
| F-iv | Table of Contents | C |
| F-1 thru F-6 | Appendix F Pages | B |
| F-7 | Appendix F Page | D |
| F-8 thru F-10 | Appendix F Pages | B |
| F-11 | Appendix F Page | D |
| F-12 | Appendix F Page | B |
| F-13 thru F-20 | Appendix F Pages | D |
| FP-F-1/(FP-F-2 blank) | Schematic | D |
| FP-F-3/(FP-F-4 blank) | Schematic | D |

## LIST OF EFFECTIVE PAGES (Continued)

| Page Number | Description | Revision |
|---|---|---|
| G-i | Appendix G Cover | D |
| G-ii | Proprietary Statement | D |
| G-iii | Table of Contents | D |
| G-iv | Intentionally Blank | C |
| G-1 | Appendix G Page | B |
| G-2 | Appendix G Page | D |
| G-3 thru G-5 | Appendix G Pages | B |
| G-6 thru G-8 | Appendix G Pages | D |
| H-i | Appendix H Cover | D |
| H-ii | Proprietary Statement | D |
| H-iii | Table of Contents | D |
| H-iv | Intentionally Blank | C |
| H-1 thru H-2 | Appendix H Pages | B |
| H-3 | Appendix H Page | D |
| H-4 | Appendix H Page | B |
| H-5 thru H-6 | Appendix H Pages | D |
| FP-H-1/(FP-H-2 blank) | Schematic | D |
| I-i | Appendix I Cover | D |
| I-ii | Proprietary Statement | D |
| I-iii | Table of Contents | D |
| I-iv | Table of Contents | D |
| I-0 thru I-1 | Appendix I Pages | B |
| I-2 thru I-4 | Appendix I Pages | D |
| I-5 | Appendix I Page | B |
| I-6 | Appendix I Page | D |
| I-7 thru I-8 | Appendix I Pages | B |
| I-9 | Appendix I Page | D |
| I-10 | Appendix I Page | B |
| I-11 | Appendix I Page | D |
| I-12 thru I-17 | Appendix I Pages | B |
| I-18 thru I-34 | Appendix I Pages | D |
| FP-I-1/(FP-I-2 blank) | Schematic | D |
| FP-I-3/(FP-I-4 blank) | Schematic | D |
| FP-I-5/(FP-I-6 blank) | Schematic | D |
| FP-I-7/(FP-I-8 blank) | Schematic | D |
| FP-I-9/(FP-I-10 blank) | Schematic | D |
| FP-I-11/(FP-I-12 blank) | Schematic | D |
| FP-I-13/(FP-I-14 blank) | Schematic | D |

**THIS PAGE INTENTIONALLY LEFT BLANK**

# WJ-8615 SERIES RECEIVER

# APPENDIX MANUAL

# REVISION RECORD

| Revision | Description | Date |
|---|---|---|
| A | Initial release. | 1990 |
| B | Added WJ part number to title page. Added List of Effective Pages and Revision Record. Incorporated tables as **Section 1** of the document and added **paragraphs 1.1**, **1.2**, and **1.3**. | 5/98 |
| C | Updated **Appendix B**, **Table B-2** and **Appendix I**, **Table I-2**. Added **Figure D-1**, updated **Table D-3**, and added new **paragraph D.7**, Detailed Circuit Description. | 8/98 |
| D | Incorporated 041052. | 03/01 |

**THIS PAGE INTENTIONALLY LEFT BLANK**

# TABLE OF CONTENTS

## SECTION I
## INTRODUCTION


| Paragraph | | Page |
|---|---|---|
| 1.1 | Introduction | 1-1 |
| 1.2 | WJ-8615 Series Options Standardization | 1-1 |
| 1.3 | WJ-8615 Receiver Option Applicability | 1-2 |


## LIST OF TABLES


| Table | | Page |
|---|---|---|
| 1-1 | WJ-8615 Series Options Standardization | 1-1 |
| 1-2 | WJ-8615 Receiver Option Applicability | 1-2 |

**THIS PAGE INTENTIONALLY LEFT BLANK**

# SECTION I

# INTRODUCTION

## 1.1 INTRODUCTION

This manual is a collection of appendixes, covering different options associated with WJ-8615 series VHF/UHF receivers.

## 1.2 WJ-8615 SERIES OPTIONS STANDARDIZATION

As of February 15, 1990 the options listed in **Table 1-1** are assigned the respective appendix letter, the associated title, and the corresponding header for use in all future publications.

**Table 1-1. WJ-8615 Series Options Standardization**

| Option Desig. | Appendix Desig. | Header Desig. | Option Title |
|---|---|---|---|
| BWS | A | WJ-8615/BWS OPTION | WJ-8615/BWS IF BANDWIDTH FILTER AND VIDEO FILTER SETS |
| FE | B | WJ-8615/FE OPTION | WJ-8615/FE FREQUENCY EXTENDER OPTION |
| FSLO | C | WJ-8615/FSLO OPTION | WJ-8615/FSLO FAST SECOND LO OPTION |
| FEX-16 | D | WJ-8615/FEX-16 OPTION | WJ-8615/FEX-16 FREQUENCY EXTENDER OPTION |
| WBO | E | WJ-8615/WBO OPTION | WJ-8615/WBO WIDEBAND OUTPUT OPTION |
| PRE | F | WJ-8615/PRE OPTION | WJ-8615/PRE TRACKING PRESELECTOR OPTION |
| SAO | G | WJ-8615/SAO OPTION | WJ-8615/SAO SELECTED AUDIO OUTPUT OPTION |
| HFE | H | WJ-8615/HFE OPTION | WJ-8615/HFE HIGH FREQUENCY EXTENDER OPTION |
| FEX-12 | I | WJ-8615/FEX-12 OPTION | WJ-8615/FEX-12 FREQUENCY EXTENDER OPTION |

## 1.3 WJ-8615 RECEIVER OPTION APPLICABILITY

**Table 1-2** lists the available option for the WJ-8615 series receivers and the applicability with each type receiver in the series.

**Table 1-2. WJ-8615 Receiver Option Applicability**

| Option | WJ-8615 | WJ-8615(S1) | WJ-8615D | WJ-8615P | WJ-8615TC |
|---|---|---|---|---|---|
| FE | S | S | S | S | S |
| FSLO | S | NS | S | NS | S |
| FEX-16 | NS | S | NS | S | N |
| WBO | S | S | S | S | S |
| PRE | S | S | S | S | S |
| SAO | S | S | S | S | S |
| FEX-12 | S | S | S | S | S |
| HFE | NS | NS | NS | S | S |
| BWS | 3X/2S | 3X/2S | 3X/2S | 3X/2S | 3X/2S |

NOTES:

S = SUPPORTED
NS = NOT SUPPORTED
3X/2S = 3 STANDARD, 2 ADDITIONAL OPTIONAL

# APPENDIX MANUAL

# FOR THE

# WJ-8615 SERIES VHF/UHF RECEIVER

**P/N 181482-001, Revision D**

Copyright © BAE SYSTEMS 1990
All Rights Reserved

BAE SYSTEMS
ADVANCED SYSTEMS
700 QUINCE ORCHARD ROAD
GAITHERSBURG, MARYLAND 20878-1794

March 2001

## WARNING

This equipment utilizes voltages which are potentially dangerous and may be fatal if contacted. Exercise extreme caution when working with the equipment with any protective cover removed.

## PROPRIETARY STATEMENT

This document and subject matter disclosed herein are proprietary items to which BAE SYSTEMS retains the exclusive right of dissemination, reproduction, manufacture and sale.

This document is provided to the individual or using organization for their use alone in the direct support of the associated equipment unless permission for further disclosure is expressly granted in writing.

## EXPORT STATEMENT

The technical data contained in this document is controlled for export by the U.S. Department of State under the International Traffic in Arms Regulations. It may not be re-exported, transferred or diverted to any other end-user or any other end-use without the prior written approval of the Office of Defense Trade Controls.

## WARRANTY

Seller warrants for a period of one year from the date of shipment, unless a different period has been agreed upon and incorporated into the Contract, that the products delivered or services rendered will conform to the specifications and be free from defects in workmanship and materials. THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF MERCHANTABILITY, FITNESS FOR PURPOSE, OR OTHER WARRANTIES OR GUARANTIES OF ANY KIND OR DESCRIPTION, WHETHER STATUTORY, EXPRESS, OR IMPLIED. If the goods delivered or services performed fail to conform to the warranty stated in this clause, Seller will correct the nonconformity at its expense by such repair, adjustment, modification, or replacement of the goods or services as Seller deems expedient. THE FOREGOING REMEDY OF BUYER FOR ANY FAILURE OF THE GOODS OR SERVICES TO MEET ANY WARRANTY IS EXCLUSIVE. BUYER EXPRESSLY AGREES THAT THE LIABILITY OF SELLER UNDER ANY WARRANTY SHALL NOT INCLUDE DAMAGE TO OUR LOSS OF PROPERTY OTHER THAN THE GOODS COVERED BY THE CONTRACT; LOSS OF PROFITS OR REVENUE; INCREASED COSTS OF ANY KIND; CLAIMS OF CUSTOMERS OF BUYER; OR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES. As to goods or components where the customer has funded the repair, Seller will warrant as limited above, the repaired portion of the unit for three months from the date of reshipment. EQUIPMENT OR PARTS DESCRIBED AS BEING MANUFACTURED BY OTHERS ARE SOLD BY SELLER AS IS and Buyer must look to the respective manufacturer for any and all claims with regard to said equipment or parts.

## LIST OF EFFECTIVE PAGES

| Page Number | Description | Revision |
|---|---|---|
| i | Cover | D |
| ii | Proprietary Statement | D |
| iii thru vi | List of Effective Pages | D |
| vii | Revision Record | D |
| viii | Intentionally Blank | B |
| ix | Table of Contents | B |
| x | Intentionally Blank | B |
| 1-1 | Section One Page | B |
| 1-2 | Section One Page | B |
| A-i | Appendix A Cover | D |
| A-ii | Proprietary Statement | D |
| A-iii | Table of Contents | C |
| A-iv | Intentionally Blank | C |
| A-1 thru A-4 | Appendix A Pages | B |
| B-i | Appendix B Cover | D |
| B-ii | Proprietary Statement | D |
| B-iii | Table of Contents | D |
| B-iv | Table of Contents | D |
| B-0 thru B-4 | Appendix B Pages | B |
| B-5 | Appendix B Page | C |
| B-6 thru B-8 | Appendix B Pages | B |
| B-9 thru B-34 | Appendix B Pages | D |
| FP-B-1/(FP-B-2 blank) | Schematic | D |
| FP-B-3/(FP-B-4 blank) | Schematic | D |
| FP-B-5/(FP-B-6 blank) | Schematic | D |
| FP-B-7/(FP-B-8 blank) | Schematic | D |
| FP-B-9/(FP-B-10 blank) | Schematic | D |
| FP-B-11/(FP-B-12 blank) | Schematic | D |
| FP-B-13/(FP-B-14 blank) | Schematic | D |
| C-i | Appendix C Cover | D |
| C-ii | Proprietary Statement | D |
| C-iii | Table of Contents | D |
| C-iv | Intentionally Blank | C |
| C-1 thru C-3 | Appendix C Pages | B |
| C-4 thru C-10 | Appendix C Pages | D |
| FP-C-1 thru FP-C-2 | Schematic | D |
| D-i | Appendix D Cover | D |
| D-ii | Proprietary Statement | D |
| D-iii | Table of Contents | D |
| D-iv | Table of Contents | D |
| D-1 thru D-3 | Appendix D Pages | B |
| D-4 thru D-5 | Appendix D Pages | C |
| D-6 thru D-8 | Appendix D Pages | D |
| D-9 | Appendix D Page | C |

**LIST OF EFFECTIVE PAGES (Continued)**

| Page Number | Description | Revision |
|---|---|---|
| D-10 | Appendix D Pages | D |
| D-11 thru D-12 | Appendix D Pages | C |
| D-13 thru D-19 | Appendix D Pages | D |
| D-20 thru D-21 | Appendix D Pages | C |
| D-22 | Appendix D Page | D |
| D-23 thru D-24 | Appendix D Pages | C |
| D-25 thru D-26 | Appendix D Pages | D |
| D-27 | Appendix D Page | C |
| D-28 thru D-29 | Appendix D Pages | D |
| D-30 | Appendix D Page | C |
| D-31 thru D-32 | Appendix D Pages | D |
| FP-D-1/(FP-D-2 blank) | Schematic | D |
| FP-D-3/(FP-D-4 blank) | Schematic | D |
| FP-D-5/(FP-D-6 blank) | Schematic | D |
| FP-D-7/(FP-D-8 blank) | Schematic | D |
| FP-D-9/(FP-D-10 blank) | Schematic | D |
| FP-D-11/(FP-D-12 blank) | Schematic | D |
| FP-D-13/(FP-D-14 blank) | Schematic | D |
| E-i | Appendix E Cover | D |
| E-ii | Proprietary Statement | D |
| E-iii | Table of Contents | D |
| E-iv | Intentionally Blank | C |
| E-1 | Appendix E Page | B |
| E-2 | Appendix E Page | D |
| E-3 thru E-4 | Appendix E Pages | B |
| E-5 thru E-6 | Appendix E Pages | D |
| E-7 thru E-8 | Appendix E Pages | B |
| FP-E-1/(FP-E-2 blank) | Schematic | D |
| F-i | Appendix F Cover | B |
| F-ii | Proprietary Statement | B |
| F-iii | Table of Contents | C |
| F-iv | Table of Contents | C |
| F-1 thru F-6 | Appendix F Pages | B |
| F-7 | Appendix F Page | D |
| F-8 thru F-10 | Appendix F Pages | B |
| F-11 | Appendix F Page | D |
| F-12 | Appendix F Page | B |
| F-13 thru F-20 | Appendix F Pages | D |
| FP-F-1/(FP-F-2 blank) | Schematic | D |
| FP-F-3/(FP-F-4 blank) | Schematic | D |

## LIST OF EFFECTIVE PAGES (Continued)

| Page Number | Description | Revision |
|---|---|---|
| G-i | Appendix G Cover | D |
| G-ii | Proprietary Statement | D |
| G-iii | Table of Contents | D |
| G-iv | Intentionally Blank | C |
| G-1 | Appendix G Page | B |
| G-2 | Appendix G Page | D |
| G-3 thru G-5 | Appendix G Pages | B |
| G-6 thru G-8 | Appendix G Pages | D |
| H-i | Appendix H Cover | D |
| H-ii | Proprietary Statement | D |
| H-iii | Table of Contents | D |
| H-iv | Intentionally Blank | C |
| H-1 thru H-2 | Appendix H Pages | B |
| H-3 | Appendix H Page | D |
| H-4 | Appendix H Page | B |
| H-5 thru H-6 | Appendix H Pages | D |
| FP-H-1/(FP-H-2 blank) | Schematic | D |
| I-i | Appendix I Cover | D |
| I-ii | Proprietary Statement | D |
| I-iii | Table of Contents | D |
| I-iv | Table of Contents | D |
| I-0 thru I-1 | Appendix I Pages | B |
| I-2 thru I-4 | Appendix I Pages | D |
| I-5 | Appendix I Page | B |
| I-6 | Appendix I Page | D |
| I-7 thru I-8 | Appendix I Pages | B |
| I-9 | Appendix I Page | D |
| I-10 | Appendix I Page | B |
| I-11 | Appendix I Page | D |
| I-12 thru I-17 | Appendix I Pages | B |
| I-18 thru I-34 | Appendix I Pages | D |
| FP-I-1/(FP-I-2 blank) | Schematic | D |
| FP-I-3/(FP-I-4 blank) | Schematic | D |
| FP-I-5/(FP-I-6 blank) | Schematic | D |
| FP-I-7/(FP-I-8 blank) | Schematic | D |
| FP-I-9/(FP-I-10 blank) | Schematic | D |
| FP-I-11/(FP-I-12 blank) | Schematic | D |
| FP-I-13/(FP-I-14 blank) | Schematic | D |

**THIS PAGE INTENTIONALLY LEFT BLANK**

**WJ-8615 SERIES RECEIVER**

**APPENDIX MANUAL**

**REVISION RECORD**

| Revision | Description | Date |
|---|---|---|
| A | Initial release. | 1990 |
| B | Added WJ part number to title page. Added List of Effective Pages and Revision Record. Incorporated tables as **Section 1** of the document and added **paragraphs 1.1**, **1.2**, and **1.3**. | 5/98 |
| C | Updated **Appendix B**, **Table B-2** and **Appendix I**, **Table I-2**. Added **Figure D-1**, updated **Table D-3**, and added new **paragraph D.7**, Detailed Circuit Description. | 8/98 |
| D | Incorporated 041052. | 03/01 |

**THIS PAGE INTENTIONALLY LEFT BLANK**

# TABLE OF CONTENTS

## SECTION I
## INTRODUCTION


| Paragraph | | Page |
|---|---|---|
| 1.1 | Introduction | 1-1 |
| 1.2 | WJ-8615 Series Options Standardization | 1-1 |
| 1.3 | WJ-8615 Receiver Option Applicability | 1-2 |


## LIST OF TABLES


| Table | | Page |
|---|---|---|
| 1-1 | WJ-8615 Series Options Standardization | 1-1 |
| 1-2 | WJ-8615 Receiver Option Applicability | 1-2 |

**THIS PAGE INTENTIONALLY LEFT BLANK**

# SECTION I

# INTRODUCTION

## 1.1 INTRODUCTION

This manual is a collection of appendixes, covering different options associated with WJ-8615 series VHF/UHF receivers.

## 1.2 WJ-8615 SERIES OPTIONS STANDARDIZATION

As of February 15, 1990 the options listed in **Table 1-1** are assigned the respective appendix letter, the associated title, and the corresponding header for use in all future publications.

**Table 1-1. WJ-8615 Series Options Standardization**

| Option Desig. | Appendix Desig. | Header Desig. | Option Title |
|---|---|---|---|
| BWS | A | WJ-8615/BWS OPTION | WJ-8615/BWS IF BANDWIDTH FILTER AND VIDEO FILTER SETS |
| FE | B | WJ-8615/FE OPTION | WJ-8615/FE FREQUENCY EXTENDER OPTION |
| FSLO | C | WJ-8615/FSLO OPTION | WJ-8615/FSLO FAST SECOND LO OPTION |
| FEX-16 | D | WJ-8615/FEX-16 OPTION | WJ-8615/FEX-16 FREQUENCY EXTENDER OPTION |
| WBO | E | WJ-8615/WBO OPTION | WJ-8615/WBO WIDEBAND OUTPUT OPTION |
| PRE | F | WJ-8615/PRE OPTION | WJ-8615/PRE TRACKING PRESELECTOR OPTION |
| SAO | G | WJ-8615/SAO OPTION | WJ-8615/SAO SELECTED AUDIO OUTPUT OPTION |
| HFE | H | WJ-8615/HFE OPTION | WJ-8615/HFE HIGH FREQUENCY EXTENDER OPTION |
| FEX-12 | I | WJ-8615/FEX-12 OPTION | WJ-8615/FEX-12 FREQUENCY EXTENDER OPTION |

## 1.3 WJ-8615 RECEIVER OPTION APPLICABILITY

**Table 1-2** lists the available option for the WJ-8615 series receivers and the applicability with each type receiver in the series.

**Table 1-2. WJ-8615 Receiver Option Applicability**

| Option | WJ-8615 | WJ-8615(S1) | WJ-8615D | WJ-8615P | WJ-8615TC |
|---|---|---|---|---|---|
| FE | S | S | S | S | S |
| FSLO | S | NS | S | NS | S |
| FEX-16 | NS | S | NS | S | N |
| WBO | S | S | S | S | S |
| PRE | S | S | S | S | S |
| SAO | S | S | S | S | S |
| FEX-12 | S | S | S | S | S |
| HFE | NS | NS | NS | S | S |
| BWS | 3X/2S | 3X/2S | 3X/2S | 3X/2S | 3X/2S |

NOTES:

S = SUPPORTED
NS = NOT SUPPORTED
3X/2S = 3 STANDARD, 2 ADDITIONAL OPTIONAL

# WJ-8615 RECEIVER

## APPENDIX A

## IF BANDWIDTH FILTER AND VIDEO FILTER SETS

Copyright © BAE SYSTEMS 1990
All Rights Reserved

BAE SYSTEMS
ADVANCED SYSTEMS
700 QUINCE ORCHARD ROAD
GAITHERSBURG, MARYLAND 20878-1794

March 2001

## PROPRIETARY STATEMENT

This document and subject matter disclosed herein are proprietary items to which BAE SYSTEMS retains the exclusive right of dissemination, reproduction, manufacture and sale.

This document is provided to the individual or using organization for their use alone in the direct support of the associated equipment unless permission for further disclosure is expressly granted in writing.

## WARRANTY

Seller warrants for a period of one year from the date of shipment, unless a different period has been agreed upon and incorporated into the Contract, that the products delivered or services rendered will conform to the specifications and be free from defects in workmanship and materials. THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF MERCHANTABILITY, FITNESS FOR PURPOSE, OR OTHER WARRANTIES OR GUARANTIES OF ANY KIND OR DESCRIPTION, WHETHER STATUTORY, EXPRESS, OR IMPLIED. If the goods delivered or services performed fail to conform to the warranty stated in this clause, Seller will correct the nonconformity at its expense by such repair, adjustment, modification, or replacement of the goods or services as Seller deems expedient. THE FOREGOING REMEDY OF BUYER FOR ANY FAILURE OF THE GOODS OR SERVICES TO MEET ANY WARRANTY IS EXCLUSIVE. BUYER EXPRESSLY AGREES THAT THE LIABILITY OF SELLER UNDER ANY WARRANTY SHALL NOT INCLUDE DAMAGE TO OUR LOSS OF PROPERTY OTHER THAN THE GOODS COVERED BY THE CONTRACT; LOSS OF PROFITS OR REVENUE; INCREASED COSTS OF ANY KIND; CLAIMS OF CUSTOMERS OF BUYER; OR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES. As to goods or components where the customer has funded the repair, Seller will warrant as limited above, the repaired portion of the unit for three months from the date of reshipment. EQUIPMENT OR PARTS DESCRIBED AS BEING MANUFACTURED BY OTHERS ARE SOLD BY SELLER AS IS and Buyer must look to the respective manufacturer for any and all claims with regard to said equipment or parts.

## TABLE OF CONTENTS

## APPENDIX A

## WJ-8615/BWS IF BANDWIDTH FILTER AND VIDEO FILTER SETS


| Paragraph | | Page |
|---|---|---|
| A.1 | General Description | A-1 |


## LIST OF TABLES


| Table | | Page |
|---|---|---|
| A-1 | Available IF Bandwidth Sets and Associated Components | A-2 |

**THIS PAGE INTENTIONALLY LEFT BLANK**

# APPENDIX A

## WJ-8615/BWS IF BANDWIDTH FILTER AND VIDEO FILTER SETS

### A.1 GENERAL DESCRIPTION

The WJ-8615 Series Receiver may contain up to five user selectable IF bandwidths which are factory configured prior to delivery. Three IF bandwidths are installed in the standard receiver. As an option, two additional IF bandwidths may be installed.

**Table A-1** provides a list of the available IF bandwidths for the WJ-8615 Receiver and the part numbers of the components associated with each selection. The IF bandwidth filter and Bandwidth/Video Response Assembly components for each receiver are unique to the IF bandwidth configuration of that receiver. The actual IF bandwidth is determined by the crystal filter (FL1-FL5) installed on the Type 726016-X IF Bandwidth Filter Amplifier Assembly (A1A12). Video bandwidth is determined by the appropriate Bandwidth/Video Response Assembly (A1-A5), installed on the Type 796622-X Audio/Video Assembly (A1A10). The Type 796251-4 Preamplifier/Converter Assembly (A1A13) is required when the receiver's IF bandwidth set contains a 6 MHz or greater IF bandwidth.

**Table A-1. Available IF Bandwidth Sets and Associated Components**

| IF Bandwidth Set | Description | IF Bandwidth Filter Part Number | Bandwidth/Video Response Assembly Part Number |
|---|---|---|---|
| 8615/3.2K | 3.2 kHz Individual Bandwidth | 92289 (Alt. 92272) | 281516-15 |
| 8615/6.4K | 6.4 kHz Individual Bandwidth | 92299 (Alt. 92271) | 281516-1 |
| 8615/10K | 10 kHz Individual Bandwidth | 92293 (Alt. 92001) | 281516-2 |
| 8615/15K | 15 kHz Individual Bandwidth | 92300 (Alt. 92296) | 281516-3 |
| 8615/20K | 20 kHz Individual Bandwidth | 92294 (Alt. 92002) | 281516-4 |
| 8615/25K | 25 kHz Individual Bandwidth | 92340 (Alt. 92165) | 281516-17 |
| 8615/30K | 30 kHz Individual Bandwidth | 92301 (Alt. 92245) | 281516-16 |
| 8615/40K | 40 kHz Individual Bandwidth | 92302 (Alt. 92198) | 281516-5 |
| 8615/50K | 50 kHz Individual Bandwidth | 92291 (Alt. 92000) | 281516-6 |
| 8615/75K | 75 kHz Individual Bandwidth | 92303 (Alt. 92230) | 281516-7 |
| 8615/100K | 100 kHz Individual Bandwidth | 92292 (Alt. 92024) | 281516-8 |
| 8615/150K | 150 kHz Individual Bandwidth | 92304 (Alt. 92307) | 281516-18 |
| 8615/250K | 250 kHz Individual Bandwidth | 92317 (Alt. 92186) | 281516-9 |
| 8615/300K | 300 kHz Individual Bandwidth | 92290 (Alt. 92232) | 281516-10 |
| 8615/500K | 500 kHz Individual Bandwidth | 92288 (Alt. 92277) | 281516-11 |

**Table A-1. Available IF Bandwidth Sets And Associated Components** (Continued)

| IF Bandwidth Set | Description | IF Bandwidth Filter Part Number | Bandwidth/Video Response Assembly Part Number |
|---|---|---|---|
| 8615/1M | 1 MHz Individual Bandwidth | 92287 (Alt. 92278) | 281516-12 |
| 8615/2M | 2 MHz Individual Bandwidth | 92286 (Alt. 92279) | 281516-13 |
| 8615/3.2M | 3.2 MHz Individual Bandwidth | 92491 | 281516-24 |
| 8615/4M | 4 MHz Individual Bandwidth | 92285 (Alt. 92280) | 281516-14 |
| 8615P/10KG* | 10 kHz Individual Bandwidth with Group Delay | 92474 | 281516-2 |
| 8615P/300KG* | 300 kHz Individual Bandwidth with Group Delay | 92472 | 281516-10 |
| 8615P/500K* | 500 kHz Individual Bandwidth | 92288 | 281516-19 |
| 8615P/700KG* | 700 kHz Individual Bandwidth Equalized | 92445 | 281516-27 |
| 8615P/1M* | 1 MHz Individual Bandwidth | 92287 | 281516-20 |
| 8615P/2M* | 2 MHz Individual Bandwidth | 92286 | 281516-21 |
| 8615P/4M* | 4 MHz Individual Bandwidth | 92285 | 281516-22 |
| 8615P/6M* (1) | 6 MHz Individual Bandwidth | 92305 | 281516-26 |
| 8615P/8M* (1) | 8 MHz Individual Bandwidth | 92373 | 281516-25 |
| 8615P/10M* (1) | 10 MHz Individual Bandwidth | 92485 | 281516-23 |

**Table A-1. Available IF Bandwidth Sets And Associated Components** (Continued)

| IF Bandwidth Set | Description | IF Bandwidth Filter Part Number | Bandwidth/Video Response Assembly Part Number |
|---|---|---|---|
| 8615P/1MG* | 1 MHz Individual Bandwidth with Group Delay | 92470 | 281516-20 |
| 8615P/1.4MG* | 1.4 MHz Individual Bandwidth Equalized | 92446 | 281516-28 |
| 8615P/2MG* | 2 MHz Individual Bandwidth with Group Delay | 92469 | 281516-21 |
| 8615/4MG* | 4 MHz Individual Bandwidth with Group Delay | 92468 | 281516-22 |
| 8615P/6MG* (1) | 6 MHz Individual Bandwidth with Group Delay | 92467 | 281516-26 |
| 8615P/8MG* (1) | 8 MHz Individual Bandwidth with Group Delay | 92466 | 281516-25 |

* WJ-8615P Receivers only

(1) Requires Type 796251-4 Preamplifier/Converter Assembly.

# WJ-8615 RECEIVER

## APPENDIX B

## FREQUENCY EXTENDER OPTION

Copyright © BAE SYSTEMS 1990
All Rights Reserved

BAE SYSTEMS
ADVANCED SYSTEMS
700 QUINCE ORCHARD ROAD
GAITHERSBURG, MARYLAND 20878-1794

March 2001

## PROPRIETARY STATEMENT

This document and subject matter disclosed herein are proprietary items to which BAE SYSTEMS retains the exclusive right of dissemination, reproduction, manufacture and sale.

This document is provided to the individual or using organization for their use alone in the direct support of the associated equipment unless permission for further disclosure is expressly granted in writing.

## WARRANTY

Seller warrants for a period of one year from the date of shipment, unless a different period has been agreed upon and incorporated into the Contract, that the products delivered or services rendered will conform to the specifications and be free from defects in workmanship and materials. THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF MERCHANTABILITY, FITNESS FOR PURPOSE, OR OTHER WARRANTIES OR GUARANTIES OF ANY KIND OR DESCRIPTION, WHETHER STATUTORY, EXPRESS, OR IMPLIED. If the goods delivered or services performed fail to conform to the warranty stated in this clause, Seller will correct the nonconformity at its expense by such repair, adjustment, modification, or replacement of the goods or services as Seller deems expedient. THE FOREGOING REMEDY OF BUYER FOR ANY FAILURE OF THE GOODS OR SERVICES TO MEET ANY WARRANTY IS EXCLUSIVE. BUYER EXPRESSLY AGREES THAT THE LIABILITY OF SELLER UNDER ANY WARRANTY SHALL NOT INCLUDE DAMAGE TO OUR LOSS OF PROPERTY OTHER THAN THE GOODS COVERED BY THE CONTRACT; LOSS OF PROFITS OR REVENUE; INCREASED COSTS OF ANY KIND; CLAIMS OF CUSTOMERS OF BUYER; OR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES. As to goods or components where the customer has funded the repair, Seller will warrant as limited above, the repaired portion of the unit for three months from the date of reshipment. EQUIPMENT OR PARTS DESCRIBED AS BEING MANUFACTURED BY OTHERS ARE SOLD BY SELLER AS IS and Buyer must look to the respective manufacturer for any and all claims with regard to said equipment or parts.

## TABLE OF CONTENTS

## APPENDIX B

## WJ-8615 FREQUENCY EXTENDER OPTION


| Paragraph | | Page |
|---|---|---|
| B.1 | General Description | B-1 |
| B.1.1 | List of Parts Supplied | B-1 |
| B.2 | Installation | B-1 |
| B.3 | Operation | B-2 |
| B.4 | Circuit Description | B-2 |
| B.4.1 | Functional Description | B-2 |
| B.4.2 | Detailed Circuit Description | B-3 |
| B.4.2.1 | Type 280899-3 Switch Assembly (A3A2) | B-3 |
| B.4.2.2 | Type 796414-4 UHF Preselector (A3A1A1) | B-3 |
| B.4.2.3 | Type 796415-1 UHF Preamplifier/Mixer (A3A1A2) | B-4 |
| B.4.2.4 | Type 798079-2 UHF LO Synthesizer (A3A1A3) | B-6 |
| B.4.2.5 | Part 390421-1 HF Variable Divider (A3A1A3A1) | B-6 |
| B.5 | Performance Test | B-7 |
| B.6 | Alignment | B-8 |
| B.7 | List of Manufacturers | B-9 |
| B.8 | Provisioning Note – Inconsistencies in Part Numbering Conventions | B-10 |
| B.9 | Replacement Parts List | B-11 |
| B.9.1 | Type 796456-3 Frequency Extender (A3) | B-14 |
| B.9.1.1 | Type 380762-1 Motherboard Assembly (A3A1) | B-16 |
| B.9.1.1.1 | Type 796414-4 UHF Preselector, (3A1A1X) | B-17 |
| B.9.1.1.2 | Type 796415-1 UHF Preamplifier/Mixer, (A3A1A3) | B-20 |
| B.9.1.1.3 | Type 798079-2 VHF LO Synthesizer (A3A1A3) | B-24 |
| B.9.1.1.3.1 | Type 390421-1 UHF Variable Divider, (A3A1A3A1 | B-25 |
| B.9.1.1.3.2 | Type 796719-1 VHF Oscillator Assembly, (A3A1A3A2) | B-28 |
| B.9.1.1.3.2.1 | Type 381473-1 UHF Oscillator PC Assembly, (A3A1A3A2A1) | B-29 |
| B.9.2 | Type 290899-3 RF Switch, (A3A2) | B-32 |


## LIST OF TABLES


| Table | | Page |
|---|---|---|
| B-1 | UHF Preselector Bandpass Selection Table | B-4 |
| B-2 | UHF Tuning Table | B-5 |

## TABLE OF CONTENTS (Continued)

## LIST OF ILLUSTRATIONS (Continued)


| Figure | | Page |
|---|---|---|
| B-1 | WJ-8615 Frequency Extender | B-0 |
| B-2 | WJ-8615/FE Left Side Component View | B-12 |
| B-3 | WJ-8615/FE Right Side Component View | B-13 |
| B-4 | Type 380762-1 Motherboard (A3A1), Location of Components | B-15 |
| B-5 | Type 796414-4 UHF Preselector (A3A1A1), Location of Components | B-18 |
| B-6 | Type 796415-1 Preamplifier/Mixer (A3A1A2), Location of Components | B-21 |
| B-7 | Type 798079-2 UHF LO Synthesizer (A3A1A3), Location of Components | B-23 |
| B-8 | Type 390421-1 UHF Variable Divider (A3A1A3A1), Location of Components | B-27 |
| B-9 | Type 381473-1 UHF Oscillator PC Assembly (A3A1A3A2A1), Location of Components | B-31 |
| B-10 | Type 280899-3 RF Switch (A3A2), Location of Components | B-33 |


## FOLDOUTS


| Foldout | | Page |
|---|---|---|
| FO-B-1 | Type 380762-1 Motherboard (A3A1), Schematic Diagram 480651 | FP-B-1 |
| FO-B-2 | Type 796414-4 UHF Preselector (A3A1A1), Schematic Diagram 480604 | FP-B-3 |
| FO-B-3 | Type 796415-1 UHF Preamplifier/Mixer (A3A1A2), Schematic Diagram 480592 | FP-B-5 |
| FO-B-4 | Type 798079-2 UHF LO Synthesizer (A3A1A3), Schematic Diagram 590163 | FP-B-7 |
| FO-B-5 | Type 796719-1 UHF Oscillator (A3A1A3A2), Schematic Diagram 481200 | FP-B-9 |
| FO-B-6 | Type 280899-3 RF Switch (A3A2), Schematic Diagram 480653 | FP-B-11 |
| FO-B-7 | Type 796456-3 Frequency Extender Main Chassis (A3), Schematic Diagram 480649 | FP-B-13 |

# APPENDIX B

# WJ-8615 FREQUENCY EXTENDER OPTION

## B.1 GENERAL DESCRIPTION

The WJ-8615/FE Option extends the upper tuning range of the receivers in the WJ-8615 family from 500 MHz to 1100 MHz. The FE is composed of the UHF Preselector (A3A1A1) Type 796414-4, the UHF Preamplifier Mixer (A3A1A2) Type 796415-1, the UHF LO Synthesizer (A3A1A3) Type 798079-2 and the RF Switch (A3A2) Type 280899-3. When the receiver is tuned to frequencies within the extended frequency range (500-1100 MHz), the received signal is mixed with one of four fixed LO frequencies. The difference frequency (the result of down conversion) is within the VHF tuning range of the receiver.

### B.1.1 LIST OF PARTS SUPPLIED

The following items are included as part of the Frequency Extender Type 796456-1.

| Item | Ref. Designation | Type | Qty. |
|---|---|---|---|
| A3 | FE Option | 796456-3 | 1 |
| A3A1 | Motherboard | 380762-1 | 1 |
| A3A1A1 | UHF Preselector | 796414-4 | 1 |
| A3A1A2 | UHF Preamp/Mixer | 796415-1 | 1 |
| A3A1A3 | UHF LO Synthesizer | 798079-2 | 1 |
| A3A1A3A1 | UHF Var. Divider | 390421-1 | 1 |
| A3A1A3A2 | UHF Oscillator Assembly | 796719-1 | 1 |
| A3A2 | RF Switch | 280899-3 | 1 |

These items are included with the Frequency Extender. Replacement parts for these subassemblies are listed in **paragraph 1.7**.

## B.2 INSTALLATION

Installation of the Frequency Extender option can be performed by following the procedure below.

**CAUTION**

When installing the Frequency Extender (FE) Option, special precautions should be taken to prevent the possibility of damaging the UHF Preselector and UHF Preamp/Mixer subassemblies. Two different versions of the FE Option exist. Subassemblies from one version MUST NOT be mixed with the other version. Use only Type 794111-1 UHF Preselector (A3A1A1) with Type 798075-1 UHF Preamp/Mixer (A3A1A2) or Type 796414-4 UHF Preselector (A3A1A1) with Type 796415-1 Preamp/Mixer (A3A1A2). Interchanging the different version types could result in physical damage to the subassemblies.

**Installation Procedure:**

1) Remove the screws securing the rear panel and extend the rear panel.

2) Remove the middle support bracket. Carefully move the cables near the bracket to allow its removal.

3) Install the supplied support bracket and put the spacer for Aux. Connector J13 behind the connector.

4) Unlace the cable bundle, on the bottom of the unit. Remove the cable to J6 and replace it with the supplied connector cable.

5) Unlace the cable to A1A14J1. Install the fan and FE subassembly. To secure the end plate to the FE subassembly put the screws through the side of the unit far enough to hold the plate in place. Then align the screw holes in the subassembly and secure with the remaining screws.

6) Connect P1 to J1 and P7 to J7. Existing cabling may have to be carefully moved. Connect A1A14 to the FE subassembly and connect the FE output cable to A1A14.

7) Relace the wire bundles and reconnect the rear panel to the unit.

## B.3 OPERATION

Operation of the WJ-8615 receiver configured with the FE option is very similar to standard WJ-8615 operation. Installation of this option allows the extended frequency range to be tuned directly from the front panel or remotely via the FRQ mnemonic.

## B.4 CIRCUIT DESCRIPTION

### B.4.1 FUNCTIONAL DESCRIPTION

With the FE Option installed, the 20-500 MHz output from the RF Switch (A3A2) is applied to a VHF/UHF select switch in the Type 796415-1 UHF Preamplifier/Mixer (A3A1A2), and the 500-1100 MHz RF Switch output is applied to the input of the UHF Preselector (A3A1A1) Type 796414-4. Refer to Figure B-15 for the WJ-8615 Frequency Extender Main Chassis schematic diagram.

When the receiver is tuned to frequencies above 500 MHz, the incoming signals are applied from the 500-1100 MHz output of the RF Switch to the input of the UHF Preselector (A3A1A1). The UHF Preselector divides the 500 to 1100 MHz RF frequency range into 4 bands (500 to 599, 600 to 699, 700 to 899 and 900-1100 MHz). Switching between bands is accomplished via the PIN diode switching network, which applies the signal through the selected bandpass filter, determined by the tuned frequency of the receiver. The

control signals from the UHF LO Synthesizer (A3A1A3) provide bias current to the PIN diode switching network to accomplish switching between the preselector bands as the UHF LO Synthesizer is tuned.

From the UHF Preselector, the RF signal is applied to the UHF Preamplifier/Mixer (A3A1A2), where the signal is amplified and mixed with the LO signal provided by the UHF LO Synthesizer (A3A1A3) producing an output frequency within the VHF frequency range. A voltage controlled attenuator (U2) within UHF Preamplifier/Mixer provides automatic gain control (AGC) for this subassembly. U2 receives a dc bias voltage from the AGC circuitry of the receiver which varies with respect to the strength of the received signal, thus controlling the overall gain of the FE Option. The amount of attenuation introduced by U2 varies directly with the strength of the tuned signal providing a relatively constant signal to the mixer (U3). From the mixer, the down converted signal is applied to the receiver via the UHF/VHF select switch in the output circuitry of the UHF Preamplifier/Mixer.

When the receiver is tuned to 500 MHz or less, the UHF/VHF switch, at the output of the UHF Preamplifier, switches to provide a signal path from the 20-500 MHz RF Switch output to the VHF section of the receiver. At this time, the output from the UHF section is cut off.

## B.4.2 DETAILED CIRCUIT DESCRIPTION

### B.4.2.1 Type 280899-3 Switch Assembly (A3A2)

The reference designation for this subassembly is A3A2. Refer to **Figure B-15** for the Type 280899-3 RF Switch schematic diagram.

RF Switch (A3A2) Type 280899-3 receives input RF signals from the Antenna Input (J1). Received RF signals are capacitively coupled through C7 and C9 to the two filter branches. One branch, consisting of L6 and L7, C10 through C15 and their associated components, forms the VHF (500-1100 MHz) bandpass filter. Filter branch selection is accomplished via voltages from the Motherboard (A3A1) applied to E1 and E2 of the RF Switch Assembly. When the receiver tuned frequencies are from 20 to 500 MHz, a +15 Vdc is applied to E1 of the RF switch. At the same time a -10 Vdc is applied to E2. Applying a +15 Vdc to E1, of the RF Switch (A3A2), forward biases CR3 and allows the received RF signal to flow through the VHF filter branch and to J2 of the UHF Preamplifier/Mixer (A3A1A2). While the +15 Vdc is applied to E1 a -10 Vdc is applied to E2. This -10 Vdc reverse biases CR4 and prohibits signal flow through the UHF bandpass filter branch. Tuning the receiver to frequencies from 500-1100 MHz causes the voltages applied to E1 and E2 to be reversed. The -10 Vdc on E1 inhibits the flow of signals through the VHF branch by reverse biasing CR3. The +15 Vdc applied to E2 forward biases CR4 and permits UHF signals to be passed through the UHF bandpass filter branch.

### B.4.2.2 Type 796414-4 UHF Preselector (A3A1A1)

The reference designation for this subassembly is A3A1A1. Refer to **Figure B-12** for the Type 796414-4 UHF Preselector schematic diagram.

The Type 796414-4 UHF Preselector (A3A1A1) provides the first stage of RF preselection for the 500-1100 MHz UHF signals. This subassembly utilizes three bandpass filters (FL1 through FL3) dividing the UHF spectrum into three bands: 500-700, 700-900 and 900-1100 MHz. Each bandpass filter is essentially

flat over its specified frequency and passes these frequencies with minimum attenuation (0.5 dB). Frequencies out of the filter bandpass are attenuated, thus improving image frequency and IF rejection. The RF signal enters the UHF preselector via P1 of cable W1 and is coupled by C1 to the PIN diode switching network comprised of CR1 through CR14. This switching network applies the signal of interest through the appropriate bandpass filter, according to the tuned frequency of the receiver. From the filter, the RF signal is coupled through C12 to the output (P2 of W2).

Switching of the RF signal through the proper filter is controlled by the Band A*, B* and C* select inputs. Dependent upon the tuned frequency, the Band A*, B*, or C* select is placed at -10 Vdc providing a current-sink through its respective series input and output PIN diodes. When conducting, the diodes provide a minimum impedance path for the RF signal through the filter within the selected branch. The remaining select inputs are held at +15 Vdc which provides a current source for the shunt diodes in their switch branch. The series diodes in these branches are cut off, thus blocking the RF signal path. The select inputs required to activate each filter branch are illustrated in the UHF Preselector Bandpass Selection Table (**Table B1**). Each of the select inputs are provided by the Digital Control Section, automatically selecting the proper filter for the frequency tuned.

**Table B-1. UHF Preselector Bandpass Selection Table**

| Select UHF/VHF | C* | B* | A* | Active Filter | Bandpass (MHz) |
|---|---|---|---|---|---|
| 0 | 1 | 1 | 1 | --- | --- |
| 1 | 1 | 1 | 0 | FL1 | 500 - 700 |
| 1 | 1 | 0 | 1 | FL2 | 700 - 900 |
| 1 | 0 | 1 | 1 | FL3 | 900 - 1100 |

0 = -10 Vdc
1 = +5 Vdc

Inductors L1 through L8, ferrite beads FB3 through FB12, resistors R1, R3 through R9 and capacitors C6 through C11 and C13 through C18 function as decoupling components. These components prevent RF signals from exiting the UHF Preselector via the select inputs of the subassembly.

### B.4.2.3 Type 796415-1 UHF Preamplifier/Mixer (A3A1A2)

The reference designation for this subassembly is A3A1A2. Refer to **Figure B-13** for the Type 796415-1 UHF Preamplifier/Mixer schematic diagram.

The RF signal from the Type 796414-1 UHF Preselector (A3A1A1) enters the UHF Preamplifier/Mixer (A3A1A2) via RF input connector J1 and is applied to the input of preamplifier U1. U1, a broadband amplifier, provides +15.5 dB of gain to the RF signal increasing the signal to a sufficient level to drive the mixer. Decoupling of the +15 Vdc input to U1 (pin 1) is accomplished by L3 and C5. The output of U1 (pin 4) is then applied to PIN diode attenuator U2 via FL1. FL1 is a 1100 MHz low-pass filter, installed in the signal path to attenuate frequencies above 1100 MHz, thus reducing image noise from U1. Voltage controlled attenuator U2, presents a constant impedance at the output of FL1 and provides a means of limiting the signal level to

*Indicates Active Low the mixer under strong signal conditions. The amount of attenuation presented by U2 is dependent on the AGC voltage provided by the AGC circuitry of the receiver applied to terminal 49 of the

UHF Preamplifier/Mixer subassembly. This voltage varies from +10 Vdc, when weak signals are present to +2 Vdc under strong signal conditions. The attenuation presented by U2 varies between -20 dB, with an AGC voltage of +2 Vdc, to -1.75 dB, with an AGC voltage of +10 Vdc. Operating bias is supplied by +15 Vdc applied to pin 1 via the decoupling network comprised of L4 and C6. Control is supplied by the AGC voltage applied to pin 5. L9, C16 and C17 provide decoupling of the AGC input line.

Double balanced mixer U3 receives the RF signal from U2 and mixes it with an LO signal provided by the UHF LO Synthesizer (A3A1A3) providing a difference frequency within the VHF range. The UHF LO Synthesizer applies one of four different fixed frequencies to the mixer to divide the UHF frequency range into four frequency bands as illustrated in the UHF Tuning Table (**Table B-2**). The Digital Control Section then tunes the VHF section of the receiver to the mixer output frequency, thus permitting the signal of interest to be further processed. The mixer output from pin 1 of U3 is coupled across dc blocking capacitor C22 and is then applied through a low-pass filter comprised of L10, C26 and C27. This filter suppresses high order harmonics of the UHF LO preventing their radiation from the VHF input (J2). From the low-pass filter, the RF signal is applied to the UHF branch of the UHF/VHF switch.

**Table B-2. UHF Tuning Table**

| RF Tuned Frequency (MHz) | LO Frequency (MHz) | FE Output Frequency (MHz) | FE Output Equation |
|---|---|---|---|
| 500 - 599 | 848 | 348 - 249 | = 848 – Tuned Frequency |
| 600 - 699 | 944 | 344 - 245 | = 994 – Tuned Frequency |
| 700 - 899 | 1144 | 444 - 245 | = 1144 – Tuned Frequency |
| 900 - 1100 | 1344 | 444 – 244 | = 1344 – Tuned Frequency |
| <500 | N/A | N/A | = Tuned Frequency |

The UHF/VHF switch, comprised of CR3 through CR6, selects the converted UHF signal from the UHF mixer or the VHF signal from the RF Switch (A3A2), entering at J2. Switching is controlled by the UHF/VHF input (terminal 53) provided by the Digital Control Section. This switching input is at a logic "1" (+5 Vdc) when the receiver is tuned to 500 MHz or above and at a logic "0" (0 Vdc) when tuned below 500 MHz. The UHF/VHF select signal from terminal 53 is applied, via R11, to the inverting input of switch driver U8B and also to the U8A non-inverting input. These switch drivers switch between +15 Vdc and -10 Vdc providing bias current for the PIN diodes in the UHF/VHF switch. With a tuned frequency of 500 MHz or higher, the +5 Vdc level causes the output of U8A to switch to +15 Vdc. This provides a current source for CR4, causing it to conduct and provides a current path for the converted UHF signal to the output of the subassembly (J4). At this time the output of U8B is at -10 Vdc, providing a current-sink for CR6. This causes CR6 to conduct and series diode CR5 to be cut off, preventing the VHF signal from passing through the switch. With tuned frequencies below 500 MHz, the outputs of U8A and U8B are reversed, causing a signal path for the VHF signal through CR5 and blocking the UHF path by cutting off CR4. The voltage divider formed by R5 and R3 provides a switching reference level of approximately 1.5 Vdc.

Integrated circuits U6 and U7 function as switch drivers for the band select circuitry of the UHF Preselector (A3A1A1). These switch drivers receive the UHF/VHF and the 20 and 21 UHF select inputs from the Digital Control Section and decode these inputs to select the proper preselector filter as the UHF LO

Synthesizer is tuned. The UHF select inputs are applied to the A, B and C inputs of decoder U4, which in turn provides a logic "1" level to the inverting input of appropriate switch driver (U7B, U6A or U6B). The UHF/VHF input is also applied directly to the non-inverting input of U7A causing the output of U7A to be held at +5 Vdc, whenever UHF is selected by the UHF/VHF select input. The remaining drivers switch according to the logic levels provided at the 20 and 21 UHF select inputs.

When the receiver is tuned between 500 and 599 MHz, 20 and 21 are both at a logic "0", causing the Q4 output of U4 to be placed at a logic "1." This level is applied at pin 6 of U6B, via CR2, causing the A* select output to be switched to -15 Vdc. At frequencies of 500 to 699 MHz, 20 is at logic "1" and 21 is at logic "0." This condition causes the Q5 output of U4 to be placed at a logic "1" level. This level is applied at pin 6 of U6B, via CR1, causing the A* select output to be switched to -15 Vdc. At tuned frequencies of 700 to 899 MHz, 20 is at a logic "0" and 21 is at a logic "1", causing the Q6 output of U4 to be placed at a logic "1." The Q6 output level is applied to the inverting input of U6A, causing the B* output to be switched to -15 Vdc. When frequencies between 900 and 1100 MHz are tuned, both the 20 and 21 select inputs are at a logic "1" state. This causes the Q7 output of U4 to be placed at a logic "1" state. The Q7 output is applied to the inverting input of U7B, causing the C* output to be switched to -15 Vdc.

The LO signal provided by the UHF LO Synthesizer is applied to the mixer (U3) via J3 and buffer amplifier U5. U5 receives the LO signal at a level of -3 dBm and provides amplification of +10 dB increasing the signal to a sufficient level to drive mixer U3. L5 and C7 function as decoupling components maintaining a signal ground potential on the +9 Vdc source.

### B.4.2.4 Type 798079-2 UHF LO Synthesizer (A3A1A3)

The reference designation for this subassembly is A3A1A3. Refer to **Figure B-13** for the Type 798079-2 UHF LO Synthesizer schematic diagram.

This subassembly consists of the UHF Variable Divider (A3A1A3A1) and the UHF Oscillator Assembly (A3A1A3A2), which together comprise the phase locked loop of the UHF LO Synthesizer. The inputs consists of the 1 MHz reference, (provided by the Synthesizer Section at J2) the UHF and UHF SEL (21, 20) select inputs provided by the Digital Control Section. The output provided consists of a fixed LO frequency of 848, 944, 1144 or 1344 MHz at J1 of the 848-1344 MHz Oscillator.

### B.4.2.5 Part 390421-1 HF Variable Divider (A3A1A3A1)

The reference designation for this part is A3A1A3A1. Refer to **Figure B-14** for the Part 390421-1 schematic diagram.

The Part 390421-1 UHF Variable Divider (A3A1A3A1) provides the tuning control for the 848-1344 MHz Oscillator, A3A1A3A2. This subassembly decodes the UHF, 20 and 21 select lines, provided by the Digital Control Section, and utilizes the decoded data to select the oscillator frequency band and to preset the divide-by-n counters in the phase-locked-loop circuitry.

Control inputs to the Part 390421-1 UHF Variable Divider consist of the UHF, $2^0$, and $2^1$ select inputs, provided at terminals E1, E2 and E3. The UHF input line, which is set to a logic "1" whenever the receiver is tuned above 500 MHz, is applied to the G input of U8 and to the cathode of CR1 enabling the Variable Divider circuitry. The 20 and 21 inputs are applied to the A and B inputs of U8 and to gates A and B

of U9. U8 and U9 then decode the select inputs selecting the oscillator frequency band and presetting binary counters U7 and U6. Comparator U5 monitors the output lines of U8 and compares the logic level at each line with a +2.5 Vdc reference, provided by the voltage divider formed by R1 and R2. Each comparator in U5 provides +15 Vdc to the appropriate band select input of the oscillator assembly when its respective input (from U8) goes low, causing the desired oscillator band to be selected. The remaining outputs of U5 are held at -15 Vdc, due to the logic "1" at their inverting inputs.

A sample of the output frequency of A3A1A3A2 enters the Variable Divider at E9 and is applied to the input of amplifier U4 via the pad formed by R9, R10 and R11. U4 amplifies the oscillator frequency and applies the signal to the input of U3, via C12. Integrated circuits U3 and U2 provide divide factors of 4 and 2, respectively, providing a total prescaling factor of 8. The prescaled output is then applied to the input of a two modulus counter which further divides the signal by a factor of 10 or 11, as determined by the CRY output of counter U6. When the CRY output is at a logic "0," U1 divides by 11 and when the output is at a logic "1," U1 divides by 10. The output of U1 is then applied as a TTL clock to counters U7 and U6.

Presetable binary counters U7 and U6 function with the two modulus counter U1 providing division factors of 106, 118, 143 or 168. U7 and U6 are preset by the decoded outputs of U8 and U9 and count up from the preset until the maximum count is reached. When the maximum count is reached, a pulse is provided to the phase detector U10 and the CRY output of U7 reloads the counters, restarting the count sequence. U7 determines the total number of counts in each count sequence and U6 determines the number of times U1 divides by 11 or 10.

For example, when a LO frequency of 848 MHz is selected, U7 is preset to "6" and U6 is preset to "9." The total count sequence continues until U7 counts up from "6" to its maximum of "15" and then resets (10 counts). Simultaneous with the count of U7, U6 counts up from its preset of "9" to its maximum of "15" (6 counts). When U6 reaches "15" the CRY output is set to 1 and U6 counting halts until the preset is reloaded. During the first 6 counts (while U6 is counting) U1 divides by a factor of 11. For the remaining 4 counts (until U7 reaches its maximum count) U1 divides by a factor of 10. The total count sequence provides a divide factor of 106 (11x6) + (10x4) . This, combined with the division factor of 8 by the prescaler, divides the oscillator output frequency by a factor of 848.

The output of U7 is applied to the phase detector (U10), where the divided signal is compared with the 1 MHz reference signal, provided by the Synthesizer Section of the receiver. The phase detector compares the frequency and phase of the two signals and generates an output representing the difference between the signals. This output is integrated by the loop filter, comprised of Q1, Q2 and associated components, to produce a tuning voltage which retunes the oscillator until the divided signal and the reference signal are equal in both frequency and phase. R18 and C22 determine the bandwidth of the loop filter, and C21 and R19 permit bandwidth adjustment.

## B.5 PERFORMANCE TEST

After the Frequency Extender Option has been installed, verify proper operation of the frequency extender via the following procedure.

1. Connect a signal generator to the Antenna Input (J1) with a CW output at -20 dBm. Connect a spectrum analyzer to J4 of the Frequency Extender.

2. Tune the signal generator and the receiver to 500 MHz. Set the spectrum analyzer center frequency to 348 MHz. Note the output level displayed on the spectrum analyzer.

3. Tune the receiver and signal generator to the following frequencies and monitor the output frequency and level on the spectrum analyzer. Verify the frequency accuracy (1 kHz) and the output level gain (+3 to +6 dB gain), compared to the level noted in step 2.

| Tuned Frequency | S.A. Frequency |
|---|---|
| 599 MHz | 249 MHz |
| 600 MHz | 344 MHz |
| 699 MHz | 245 MHz |
| 700 MHz | 444 MHz |
| 899 MHz | 245 MHz |
| 900 MHz | 444 MHz |
| 1100 MHz | 244 MHz |

## B.6 ALIGNMENT

Alignment of the Frequency Extender Option may be performed via the procedure that follows:

1. Using an RF analyzer, connect the RF analyzer reflection test port to the Antenna Input (J1) and the RF analyzer's transmission RF input to J3 of the RF Switch (A3A2). Tune the WJ-8615 to 600 MHz.

2. Observe the displayed response on the RF analyzer. Adjust the analyzer to display a 500 MHz response centered at 450 MHz.

3. Adjust L7 to notch out the frequency at 228 MHz and L6 to notch out the frequency at 337 MHz. (Coil adjustment is accomplished via compressing or spreading the coil turns.)

4. Verify that the roll off from 450 MHz to 350 MHz is a minimum of 30 dB and that the ripple from 200 MHz to 340 MHz is at least 30 dB below the level at 450 MHz.

5. Verify the insertion loss is not greater than 1.5 dB and that the bandpass ripple is not more than 1.75 dB overall.

6. With the RF analyzer transmission RF input connected to A3A2J2, connect the reflection test port to the Antenna Input (J1), tune the WJ-8615 to 400 MHz and observe the displayed response.

7. Adjust L8 and L9 to produce minimum insertion loss and maximum flatness (less than 0.5 dB loss from 400 MHz to 550 MHz).

## B.7 LIST OF MANUFACTURERS

| Mfr. Code | Name and Address |
|---|---|
| 00779 | Amp, Inc.<br>P.O. Box 3608<br>Harrisburg, PA 17105 |
| 01295 | Texas Instruments, Inc.<br>Semiconductor-Components Div.<br>13500 North Central Expressway<br>Dallas, TX 75231 |
| 02114 | Ferroxcube Corp.<br>P.O. Box 359, Mount Marion Road<br>Saugerties, NY 12477 |
| 02735 | RCA Corporation<br>Solid State Division<br>Route 202<br>Somerville, NJ 08876 |
| 04222 | AVX Ceramics<br>Division of AVX Corp.<br>Myrtle Beach, SC 29577 |
| 04713 | Motorola, Inc.<br>Semiconductor Products Division<br>Phoenix, AZ 85008 |
| 05397 | Union Carbide Corp.<br>11901 Madison Avenue<br>Cleveland, OH 44101 |
| 09021 | Airco Electronics<br>Bradford, PA 16701 |
| 14482 | Watkins-Johnson Company<br>3333 Hillview Avenue<br>Palo Alto, CA 94304 |
| 14632 | BAE SYSTEMS<br>Advanced Systems<br>700 Quince Orchard Road<br>Gaithersburg, MD 20878 |
| 18736 | Voltronics Corporation<br>West Street<br>Hanover, NJ 07936 |
| 19505 | Applied Engineering Products<br>300 Seymour Avenue<br>Derby, CT 06418 |
| 24539 | Avantek, Incorporated<br>3175 Bowers Avenue<br>Santa Clara, CA 95051 |
| 24546 | Corning Glass Works<br>Bradford, PA 16701 |
| 27014 | National Semi-Conductor Corp.<br>2950 San Ysidro Way<br>Santa Clara, CA 95051 |
| 28480 | Hewlett-Packard Company<br>1501 Page Mill Road<br>Palo Alto, CA 94304 |
| 29990 | American Technical Ceramics<br>1 Norden Lane<br>Huntington Station, NY 11746 |
| 31433 | Union Carbide Corporation<br>P.O. Box 5928<br>Greenville, SC 29606 |
| 33095 | Spectrum Control, Inc.<br>152 East Main Street<br>Fairview, PA 16415 |
| 34371 | Harris-Intertype Company<br>Semiconductor Division<br>Melbourne, FL 32901 |
| 50101 | Frequency Sources, Inc.<br>16 Maple Road<br>South Chelmsford, MA 01824 |
| 50140 | K and L Microwave, Inc.<br>203 Newton Street<br>Salisbury, MD 21801 |
| 51642 | Centre Engineering, Inc.<br>State College, PA 16801 |
| 52648 | Plessey Semiconductors<br>1641 Kaiser<br>Irvine, CA 92714 |

| Mfr. Code | Name and Address |
|---|---|
| 55969 | Metuchen Capacitors, Inc.<br>420 Park Avenue<br>Perth Amboy, NJ 08861 |
| 56289 | Sprague Electric Company<br>Marshall Street<br>North Adams, MA 01247 |
| 57856 | Aero American, Incorporated<br>7830 Balboa Boulevard<br>Van Nuys, CA 91406 |
| 59660 | Tusonix, Incorporated<br>2155 N. Forbes Blvd., Suite 107<br>Tucson, AZ 85745 |
| 71279 | Midland-Ross Corporation<br>Cambridge, MA 02140 |
| 73138 | Beckman Instruments, Inc.<br>2500 Harbor Boulevard<br>Fullerton, CA 92634 |
| 75037 | Minnesota Mining & Manuf. Co.<br>3 M Center<br>St. Paul, MN 55101 |
| 76055 | Mallory Control Division<br>P.O. Box 327<br>State Road 28W<br>Frankfort, IN 46041 |
| 80131 | Electronics Industries Assoc.<br>2001 Eye Street, N.W.<br>Washington, D.C. 20006 |
| 81312 | Winchester ElectronicsDivision<br>Litton Industries<br>Main Street and Hillside Avenue<br>Oakville, CT 06779 |
| 81349 | Military Specifications |
| 91293 | Johanson Mfg. Company<br>Boonton, NJ 07005 |
| 91506 | Augat, Incorporated<br>33 Perry Avenue<br>Attleboro, MA 02703 |
| 91984 | Maida Development Company<br>Hampton, VA 23663 |
| 96341 | Microwave Assoc., Incorporated<br>South Avenue<br>Burlington, MA 01803 |
| 98291 | Sealectro Corporation<br>225 Hoyt<br>Mamaroneck, NY 10544 |
| 99800 | American Precision Industries<br>Delevan Electronics Division<br>270 Quaker Road<br>East Aurora, NY 14052 |

## B.8 PROVISIONING NOTE - INCONSISTENCIES IN PART NUMBERING CONVENTIONS

The internal computer applications at BAE SYSTEMS Gaithersburg Operations have undergone upgrades to better serve our customers. With this upgrade came alterations to the numbering scheme for parts reporting to an end item. Due to these alterations, minor inconsistencies may exist between identifying parts numbers found on drawings, piece parts, or other documentation. No form fit and function specifications have been altered due to this change in the numbering scheme.

The inconsistencies take two forms. New part number conventions mandate the use of three-digit suffixes for part numbers used within computer applications. Part numbers having single-digit suffixes

have been altered by the addition of leading zeroes. Therefore, a piece part with an identifying number having a suffix of "-2" may be represented in a computer-generated document with a part number having a suffix of "-002". Also the new part numbering convention requires that the base portion of a part number be made up of six digits. Part numbers with base portions with less than six digits are expressed with leading zeroes to meet this requirement. Accordingly, a part number having a base of "34456" may appear as "034456". If you have questions or concerns regarding the configuration identification of piece parts, contact the plant for additional information at 1-800-954-3577.

## B.9 REPLACEMENT PARTS LIST

The following parts list contains all the electrical components and certain mechanical parts, subject to unusual wear or possible damage, used in the Frequency Extender Option. The List of Manufacturers provided in **paragraph B.7**, and the manufacturer's component part numbers are included as an aid for the equipment user in the field. The listed parts may not necessarily agree with the components installed; however, the listed parts can be used and will provide satisfactory equipment operation. Replacement parts may be obtained from any manufacturer, as long as the physical and electrical parameters of the replacement part agree with the original part.

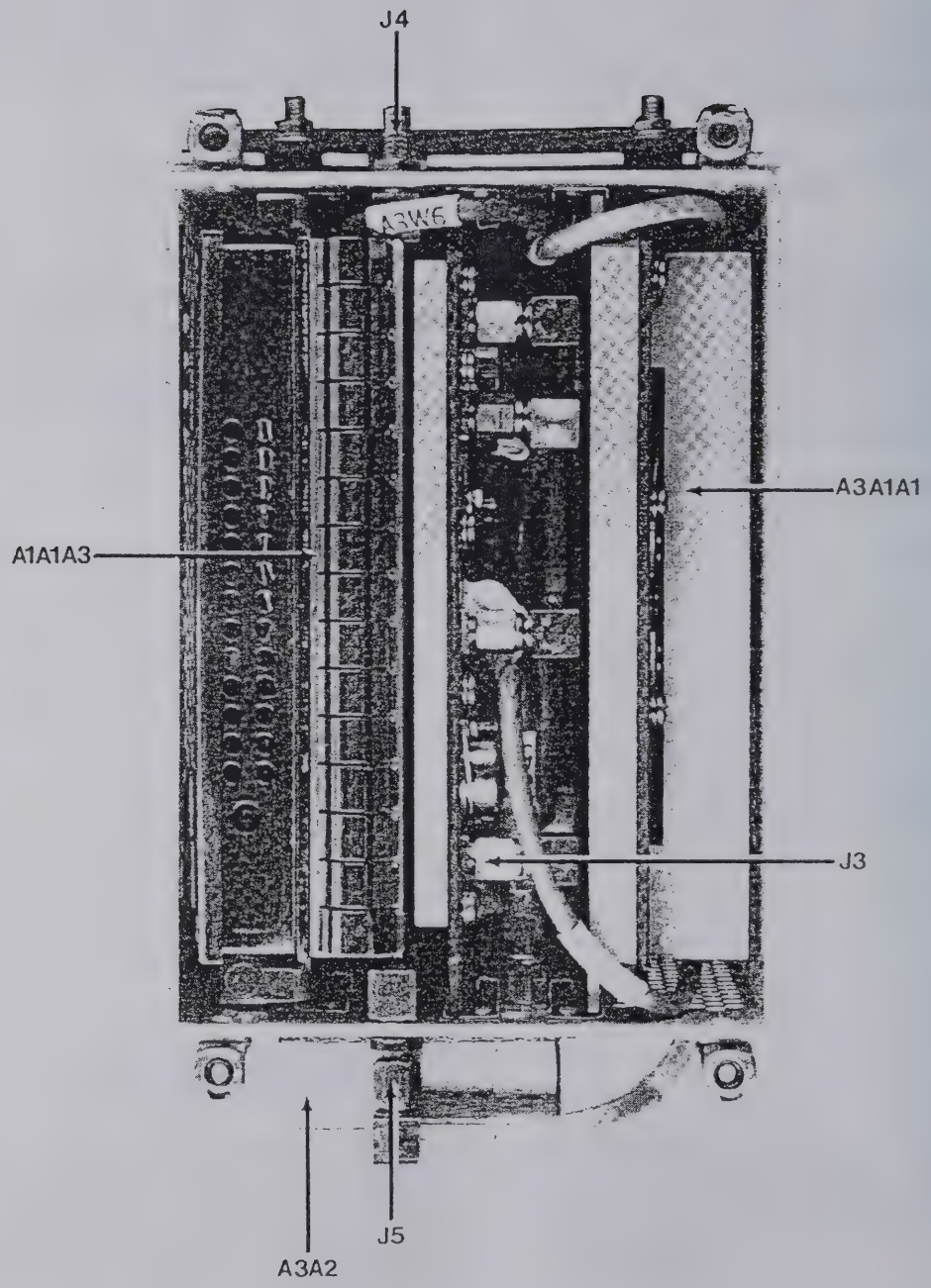



**Figure B-2. WJ-8615/FE Left Side Component View**

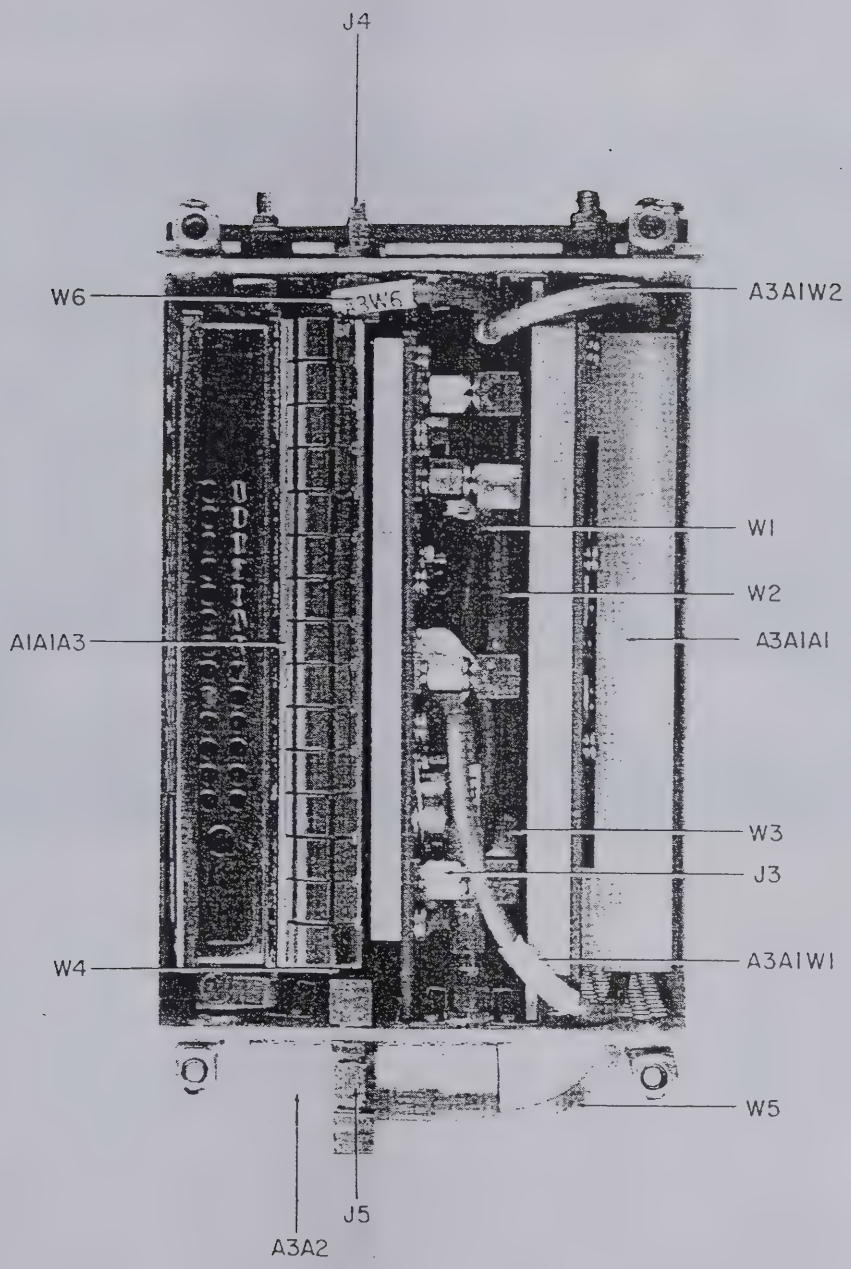



**Figure B-3. WJ-8615/FE Right Side Component View**

## B.9.1 TYPE 796456-3 FREQUENCY EXTENDER — REF DESIG PREFIX A3

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| | Revision A | | | | |
| A1 | Motherboard | 1 | 380762-1 | 14632 | |
| A2 | RF Switch | 1 | 280899-3 | 14632 | |
| A1A1 | UHF Preselector Module Assembly | 1 | 796414-4 | 14632 | |
| A1A2 | UHF Preamplifier/Mixer Module Assembly | 1 | 796415-1 | 14632 | |
| A1A3 | UHF LO Synthesizer Module Assembly | 1 | 798079-2 | 14632 | |
| C1 | Capacitor, Ceramic, Feedthru: 0.05 µF, 300 V | 9 | 54-785-005-503P | 33095 | |
| C2 Thru C9 | Same as C1 | | | | |
| FB1 | Ferrite Bead | 20 | 56-590-65-4A | 02114 | |
| FB2 Thru FB20 | Same as FB1 | | | | |
| J1 | Part of A3A2 | | | | |
| J2 | Cable, Terminal | 1 | 8146-7521-008 | 19505 | |
| J3 | Part of A3A2 | | | | |
| J4 | Connector. Plug | 2 | 50-330-0039-91 | 98291 | |
| J5 | Same as J4 | | | | |
| P1 | Connector. Plug | 2 | 1-87499-1 | 00779 | |
| P2 | Same as P1 | | | | |
| P3 | Connector. Plug | 5 | 50-328-3875-91 | 98291 | |
| P4 | Same as P3 | | | | |
| P5 | Same as P3 | | | | |
| P7 | Connector. Plug | 2 | 50-024-3875-91 | 98291 | |
| P8 | Same as P7 | | | | |
| P9 | Same as P3 | | | | |
| P10 | Same as P3 | | | | |
| P11 | Connector. Plug | 1 | 2105-7521-008 | 19505 | |
| W1 | Cable Assembly | 1 | 380535-7 | 14632 | |
| W2 | Cable Assembly | 1 | 380535-2 | 14632 | |
| W3 | Cable Assembly | 1 | 380535-3 | 14632 | |
| W4 | Cable Assembly | 1 | 380535-4 | 14632 | |
| W5 | Cable Assembly | 1 | 380535-5 | 14632 | |
| W6 | Cable Assembly | 1 | 380535-6 | 14632 | |

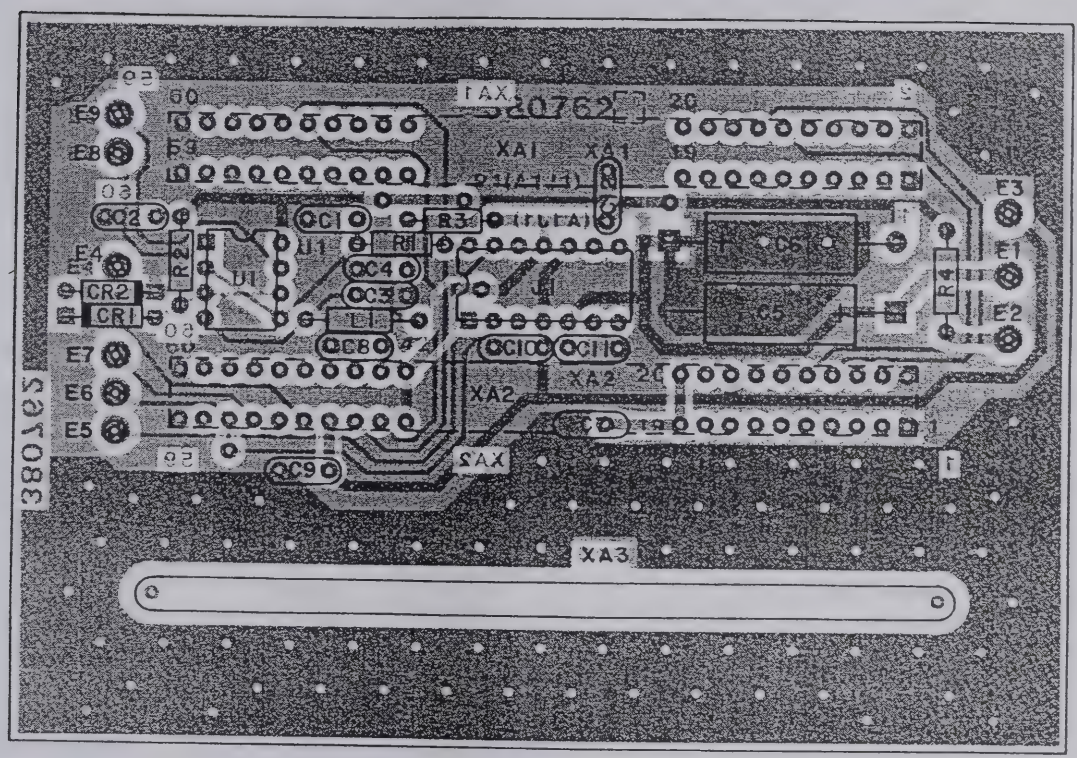



**Figure B-4. Type 380762-1 Motherboard (A3A1), Location of Components**

B.9.1.1 **Type 380762-1 Motherboard Assembly** REF DESIG PREFIX **A3A1**

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| | Revision B | | | | |
| C1 | Capacitor, Ceramic, Disc: 0.1 µF, 20%, 50 V | 3 | 34475-1 | 14632 | |
| C2 | Same as C1 | | | | |
| C3 | Same as C1 | | | | |
| C4 | Capacitor, Ceramic, Disc: 0.47 µF, 20%, 50 V | 1 | 34452-1 | 14632 | |
| C5 | Capacitor, Electrolytic, Tantalum: 100 µF, 20%, 35 V | 2 | MTP107M035P1C | 76055 | |
| C6 | Same as C5 | | | | |
| C7 | Capacitor, Ceramic, Disc: .01 µF, 20%, 50 V | 6 | 34453-1 | 14632 | |
| C8 | | | | | |
| Thru | Same as C7 | | | | |
| C12 | | | | | |
| CR1 | Diode | 2 | 1N4446 | 80131 | |
| CR2 | Same as CR1 | | | | |
| J1 | Socket, Integrated Circuit | 1 | 514-AG10D | 91506 | |
| L1 | Coil, Fixed: 0.47 µH | 1 | 1025-12 | 99800 | |
| P1 | Connector, Plug | 1 | 3406-0002 | 75037 | |
| R1 | Resistor, Fixed, Film: 1.0 kΩ, 5%, 1/8 W | 1 | CF1/8-1.0K/J | 09021 | |
| R2 | Resistor, Fixed, Film: 5.1 kΩ, 5%, 1/8 W | 1 | CF1/8-5.1K/J | 09021 | |
| R3 | Resistor, Fixed, Film: 180Ω 5%, 1/8 W | 1 | CF1/8-180 OHMS/J | 09021 | |
| R4 | Resistor, Fixed, Film: 7.5Ω, 5%, 1/4W | 1 | CF1/4-7.5 OHMS/J | 09021 | |
| U1 | Integrated Circuit | 1 | LM358N | 27014 | |
| W1 | Cable Assembly | 1 | 380532-1 | 14632 | |
| XA1 | Housing | 2 | MK30C-13-195-4381 | 81312 | |
| XA2 | Same as XA1 | | | | |
| XA3 | Connector, Receptacle, Multipin | 1 | RF30-2852-5 | 57856 | |

### B.9.1.1.1 Type 796414-4 UHF Preselector — REF DESIG PREFI A3A1A1X

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| | Revision A | | | | |
| C1 | Capacitor, Ceramic, Chip: 470 pF, 10%, 100 V | 2 | C1210C471K1GAC | 31433 | |
| C2 Thru C5 | Not Used | | | | |
| C6 | Capacitor, Ceramic, Monolithic: 220 pF, 5%, 100 V | 6 | 8121-100-C0G0-221J | 59660 | |
| C7 Thru C11 | Same as C6 | | | | |
| C12 | Same as C1 | | | | |
| C13 | Capacitor, Ceramic, Disc: 0.1 µF, 20%, 50 V | 3 | 34475-1 | 14632 | |
| C14 | Capacitor, Ceramic, Disc: 1000 pF, 500 V | 3 | 59Z5U102P | 91984 | |
| C15 | Same as C13 | | | | |
| C16 | Same as C14 | | | | |
| C17 | Same as C13 | | | | |
| C18 | Same as C14 | | | | |
| C19 | Capacitor, Variable, Air: 1-4.5 pF, 250 V | 2 | 9410-0 | 91293 | |
| C20 | Same as C19 | | | | |
| CR1 | Diode Pin | 12 | 841320 | 14632 | |
| CR2 Thru CR9 | Same as CR1 | | | | |
| CR10 | Diode | 2 | MA47201 | 96341 | |
| CR11 | Same as CR10 | | | | |
| CR12 Thru CR14 | Same as CR1 | | | | |
| FB1 | Not Used | | | | |
| FB2 | Not Used | | | | |
| FB3 | Ferrite Bead | 10 | 56-590-65-4A | 02114 | |
| FB4 Thru FB12 | Same as FB3 | | | | |
| FL1 | Filter, Bandpass: 600 MHz CF, 200 MHz Bandwidth | 1 | 92222 | 14632 | |
| FL2 | Filter, Bandpass: 800 MHz CF, 200 MHz Bandwidth | 1 | 92223 | 14632 | |
| FL3 | Filter, Bandpass: 1000 MHz CF, 200 MHz Bandwidth | 1 | 92224 | 14632 | |
| L1 | Coil, Fixed | 8 | 170134-1 | 14632 | |
| L2 Thru L8 | Same as L1 | | | | |
| L9 | Coil, Fixed | 3 | 190187-1 | 14632 | |
| L10 | Same as L9 | | | | |
| L11 | Same as L9 | | | | |
| P1 | Connector, Plug | 2 | 50-328-3875-91 | 98291 | |
| P2 | Same as P1 | | | | |

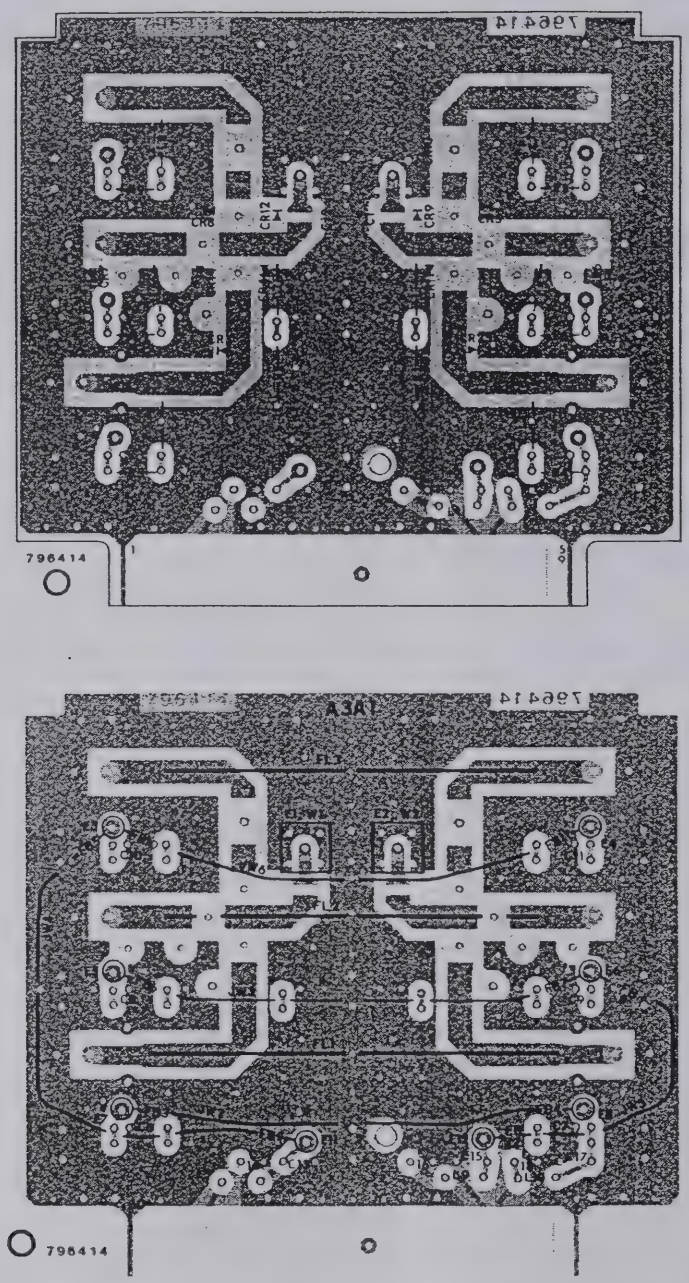



**Figure B-5. Type 796414-4 UHF Preselector (A3A1A1), Location of Components**

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| | | | REF DESIG PREFIX **A3A1A1** | | |
| R1 | Resistor, Fixed, Film: 1.2 kΩ, 5%, 1/4 W | 2 | CF1/4-1.2K/J | 09021 | |
| R2 | Not Used | | | | |
| R3 | Same as R1 | | | | |
| R4 | Resistor, Fixed, Composition: 470Ω, 5%, 1/8 W | 6 | RCR05G471JS | 81349 | |
| R5 Thru R9 | Same as R4 | | | | |
| W1 | Cable Assembly | 1 | 17300-188-3 | 14632 | |
| W2 | Cable Assembly | 1 | 17300-188-4 | 14632 | |

### B.9.1.1.2 Type 796415-1 UHF Preamplifier/Mixer — REF DESIG PREFIX A3A1A2

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| | Revision C | | | | |
| C1 | Capacitor, Electrolytic, Tantalum: 4.7 µF, 20%, 35 V | 2 | 196D475X0035JE3 | 56289 | |
| C2 | Capacitor, Ceramic, Disc: 0.1 µF, 20%, 50 V | 15 | 34475-1 | 14632 | |
| C3 | Same as C1 | | | | |
| C4 Thru C15 | Same as C2 | | | | |
| C16 | Capacitor, Ceramic, Monolithic: 470 pF, 5%, 100 V | 3 | 8121-100-C0G0-471J | 59660 | |
| C17 | Same as C16 | | | | |
| C18 | Same as C2 | | | | |
| C19 | Same as C2 | | | | |
| C20 | Capacitor, Ceramic, Disc: 1000 pF, 10%, 100 V | 2 | 8121-100-X7R0-102K | 59660 | |
| C21 | Same as C20 | | | | |
| C22 | Capacitor, Ceramic, Chip: 220 pF, 10%, 50 V | 1 | C1210C221K5GAC | 05397 | |
| C23 | Capacitor, Ceramic, Chip: .05 µF, 10%, 50 V | 2 | 1210-050-X7R-503K5 | 55969 | |
| C24 | Same as C23 | | | | |
| C25 | Same as C16 | | | | |
| C26 | Capacitor, Ceramic, Chip: 4.3 pF, 0.5%, 500 V | 2 | ATC700B4R3DP500X | 29990 | |
| C27 | Same as C26 | | | | |
| C28 | Capacitor, Ceramic, Chip: 470 pF, 10%, 100 V | 1 | C1210E471K1GAC | 31433 | |
| C29 | Capacitor, Variable, Air: 0.6-4.5 pF, 500 V | 1 | 27273 | 91293 | |
| CR1 | Diode | 2 | 1N4446 | 80131 | |
| CR2 | Same as CR1 | | | | |
| CR3 | Diode, Pin | 4 | 841320 | 50101 | |
| CR4 | Same as CR3 | | | | |
| CR5 | Same as CR3 | | | | |
| CR6 | Diode | 1 | 5082-3040 | 28480 | |
| CR7 | Not Used | | | | |
| CR8 | Same as CR3 | | | | |
| FL1 | Filter Low-Pass: 1100 MHz | 1 | 92225 | 50140 | |
| J1 | Connector, Receptacle | 4 | 1009-7511-000 | 19505 | |
| J2 Thru J4 | Same as J1 | | | | |
| L1 | Coil, Fixed | 6 | 16209-12 | 14632 | |
| L2 Thru L5 | Same as L1 | | | | |
| L6 | Coil, Fixed | 2 | 170134-1 | 14632 | |
| L7 | Coil, Fixed | 2 | 190187-1 | 14632 | |
| L8 | Same as L6 | | | | |
| L9 | Same as L1 | | | | |
| L10 | Coil, Fixed | 1 | 170189-1 | 14632 | |

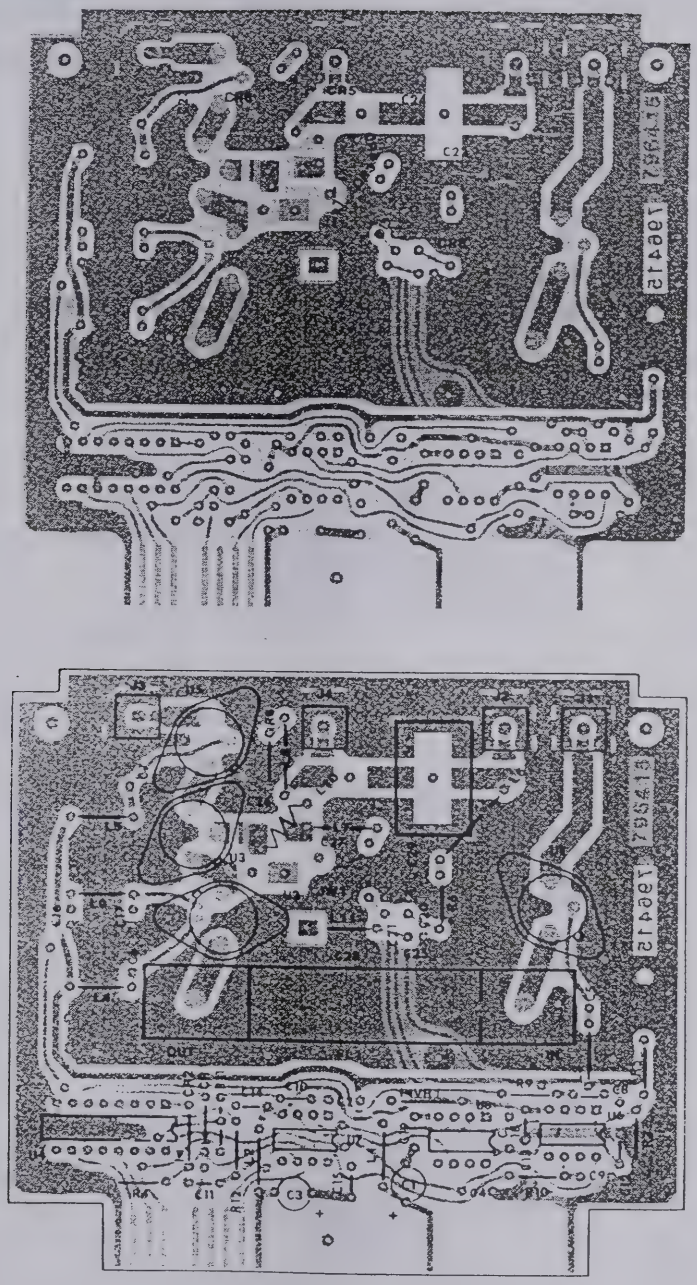


**Figure B-6. Type 796415-1 Preamplifier/Mixer (A3A1A2), Location of Components**

REF DESIG PREFIX **A3A1A2**

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| L11 | Same as L7 | | | | |
| R1 | Not Used | | | | |
| R2 | Not Used | | | | |
| R3 | Resistor, Fixed, Film: 1.8 kΩ, 5%, 1/8 W | 2 | CF1/8-1.8K/J | 09021 | |
| R4 | Resistor, Fixed, Film: 47 kΩ, 5%, 1/8 W | 1 | CF1/8-47K/J | 09021 | |
| R5 | Resistor, Fixed, Film: 12 kΩ, 5%, 1/8 W | 1 | CF1/8-12K/J | 09021 | |
| R6 | Resistor, Fixed, Film: 680Ω, 5%, 1/8 W | 2 | CF1/8-680 OHMS/J | 09021 | |
| R7 | Same as R6 | | | | |
| R8 | Resistor, Fixed, Film: 1.2 kΩ, 5%, 1/8 W | 1 | CF1/8-1.2K/J | 09021 | |
| R9 | Resistor, Fixed, Film: 18 kΩ, 5%, 1/8 W | 4 | CF1/8-18K/J | 09021 | |
| R10 Thru R12 | Same as R9 | | | | |
| R13 | Same as R3 | | | | |
| U1 | Amplifier | 1 | WJ-A12-11 | 14482 | |
| U2 | Attenuator | 1 | WJ-G1 | 14482 | |
| U3 | Mixer, Balanced | 1 | WJ-M2A | 14482 | |
| U4 | Integrated Circuit | 1 | MC14028BCP | 02735 | |
| U5 | Amplifier | 1 | WJ-A28 | 14482 | |
| U6 | Integrated Circuit | 3 | LM358N | 27014 | |
| U7 | Same as U6 | | | | |
| U8 | Same as U6 | | | | |
| VR1 | Diode, Zener: 5.1 V | 1 | 1N751A | 80131 | |

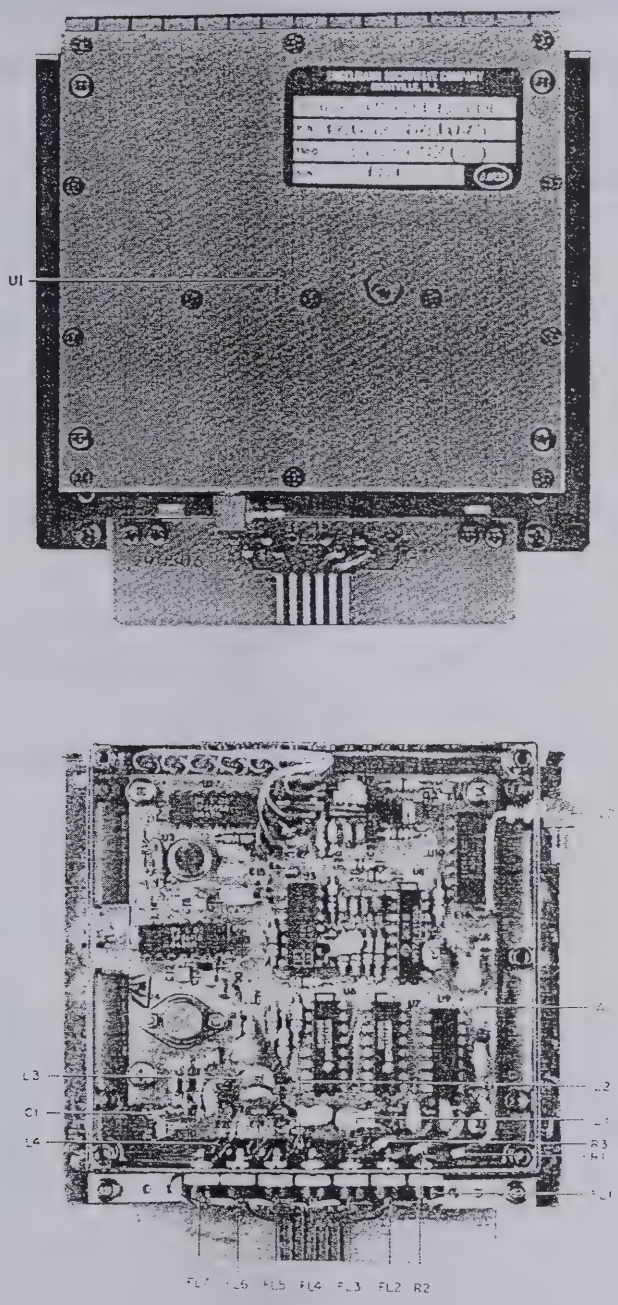



**Figure B-7. Type 798079-2 UHF LO Synthesizer (A3A1A3), Location of Components**

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| B.9.1.1.3 **Type 798079-2 UHF LO Synthesizer** | | | REF DESIG PREFIX **A3A1A3** | | |
| | Revision E | | | | |
| A1 | UHF Variable Divider | 1 | 390421-1 | 14632 | |
| A2 | UHF Oscillator Assembly | 1 | 796719-1 | 14632 | |
| C1 | Capacitor, Ceramic, Monolithic: 1.0 pF, 100 V | 1 | 100-100-NPO-109B | 51642 | |
| FB1 | Ferrite Bead | 12 | 56-590-65-4A | 02114 | |
| FB2 Thru FB12 | Same as FB1 | | | | |
| FL1 | Filter, Modified | 7 | 33728-18 | 14632 | |
| FL2 Thru FL7 | Same as FL1 | | | | |
| J1 | Not Used | | | | |
| J2 | Connector, Receptacle | 1 | 1012-1511-000 | 19505 | |
| L1 | Coil, Fixed | 4 | 16209-4 | 14632 | |
| L2 Thru L4 | Same as L1 | | | | |
| R1 | Resistor, Fixed, Film: 270Ω, 5%, 1/8 W | 3 | CF1/8-270 OHMS/J | 09021 | |
| R2 | Same as R1 | | | | |
| R3 | Same as R1 | | | | |
| R4 | Resistor, Fixed, Film: 100Ω, 5%, 1/8 W | 1 | CF1/8-100 OHMS/J | 09021 | |

B.9.1.1.3.1 ***Type 390421-1 UHF Variable Divider*** REF DESIG PREFIX **A3A1A3A1**

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| | Revision R | | | | |
| C1 | Capacitor, Ceramic, Disc: 470 pF, 10%, 1000 V | 7 | CK05BX471K | 81349 | |
| C2 | Same as C1 | | | | |
| C3 | Same as C1 | | | | |
| C4 | Capacitor, Ceramic, Disc: 0.01 µF, 20%, 50 V | 6 | 34453-1 | 14632 | |
| C5 Thru C7 | Same as C4 | | | | |
| C8 | Capacitor, Electrolytic, Tantalum: 4.7 µF, 20%, 35 V | 5 | 196D475X0035JE3 | 56289 | |
| C9 | Same as C8 | | | | |
| C10 | Capacitor, Ceramic, Disc: 0.1 µF, 20%, 50 V | 1 | 34475-1 | 14632 | |
| C11 | Capacitor, Ceramic, Chip: 470 pF, 10%, 100 V | 9 | C1210C471K1GAC | 31433 | |
| C12 Thru C18 | Same as C11 | | | | |
| C19 | Capacitor, Ceramic, Disc: 0.47 µF, 20%, 50 V | 2 | 34452-1 | 14632 | |
| C20 | Same as C8 | | | | |
| C21 | Same as C19 | | | | |
| C22 | Same as C4 | | | | |
| C23 | Same as C1 | | | | |
| C24 | Capacitor, Electrolytic, Tantalum: 22 µF, 20%, 10 V | 1 | 196D226X0010JE3 | 56289 | |
| C25 | Same as C1 | | | | |
| C26 | Same as C8 | | | | |
| C27 | Same as C8 | | | | |
| C28 | Same as C1 | | | | |
| C29 | Same as C1 | | | | |
| C30 | Same as C4 | | | | |
| C31 | Same as C11 | | | | |
| CR1 | Diode | 1 | GC4211-15 | 50101 | |
| L1 | Inductor, Air Core | 1 | 22292-170 | 14632 | |
| Q1 | Transistor | 2 | 2N3904 | 80131 | |
| Q2 | Same as Q1 | | | | |
| R1 | Resistor, Fixed, Film: 10 kΩ, 5%, 1/4 W | 7 | CF1/4-10K/J | 09021 | |
| R2 Thru R6 | Same as R1 | | | | |
| R7 | Resistor, Fixed, Film: 27Ω, 5%, 1/4 W | 1 | CF1/4-27 OHMS/J | 09021 | |
| R8 | Resistor, Fixed, Film: 100Ω, 5%, 1/4 W | 2 | CF1/4-100 OHMS/J | 09021 | |
| R9 | Resistor, Fixed, Film: 68Ω, 5%, 1/8 W | 1 | CF1/8-68 OHMS/J | 09021 | |
| R10 | Resistor, Fixed, Film: 47Ω, 5%, 1/8 W | 1 | CF1/8-47 OHMS/J | 09021 | |
| R11 | Resistor, Fixed, Film: 100Ω, 5%, 1/8 W | 1 | CF1/8-100 OHMS/J | 09021 | |
| R12 | Resistor, Fixed, Film: 1.0 kΩ, 5%, 1/4 W | 2 | CF1/4-1K/J | 09021 | |
| R13 | Resistor, Fixed, Film: 15 kΩ, 5%, 1/4 W | 1 | CF1/4-15K/J | 09021 | |

REF DESIG PREFIX **A3A1A3A1**

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| R14 | Resistor, Fixed, Film: 3.6 kΩ, 5%, 1/4 W | 1 | CF1/4-3.6K/J | 09021 | |
| R15 | Resistor, Fixed, Film: 1.5 kΩ, 5%, 1/4 W | 1 | CF1/4-1.5K/J | 09021 | |
| R16 | Not Used | | | | |
| R17 | Resistor, Fixed, Film: 330Ω, 5%, 1/4 W | 1 | CF1/4-330 OHMS/J | 09021 | |
| R18 | Same as R12 | | | | |
| R19 | Resistor, Trimmer, Film: 2 kΩ, 10%, 1/2 W | 1 | 62PAR2K | 73138 | |
| R20 | Resistor, Fixed, Film: 3.3 kΩ, 5%, 1/4 W | 1 | CF1/4-3.3K/J | 09021 | |
| R21 | Same as R1 | | | | |
| R22 | Resistor, Fixed, Film: 4.7 kΩ, 5%, 1/4 W | 1 | CF1/4-4.7K/J | 09021 | |
| R23 | Same as R8 | | | | |
| R24 | Resistor, Fixed, Film: 4.7 MΩ, 5%, 1/4 W | 1 | CF1/4-4.7M/J | 09021 | |
| R25 | Resistor, Fixed, Film: 180Ω, 5%, 1/8 W | 1 | CF1/8-180 OHMS/J | 09021 | |
| RA1 | Heatsink, Integrated Circuit | 1 | 290509-1 | 14632 | |
| U1 | Integrated Circuit | 1 | SP8695B/DG | 52648 | |
| U2 | Integrated Circuit | 1 | SP8602B/CM | 52648 | |
| U3 | Integrated Circuit | 1 | SP8611B/DG | 52648 | |
| U4 | Amplifier | 1 | GPD-410 | 24539 | |
| U5 | Integrated Circuit | 1 | HA1-4741-5 | 34371 | |
| U6 | Integrated Circuit | 2 | SN74LS161AN | 01295 | |
| U7 | Same as U6 | | | | |
| U8 | Integrated Circuit | 1 | SN74LS138N | 01295 | |
| U9 | Integrated Circuit | 1 | SN74LS04N | 01295 | |
| U10 | Integrated Circuit | 1 | MC4044P | 04713 | |

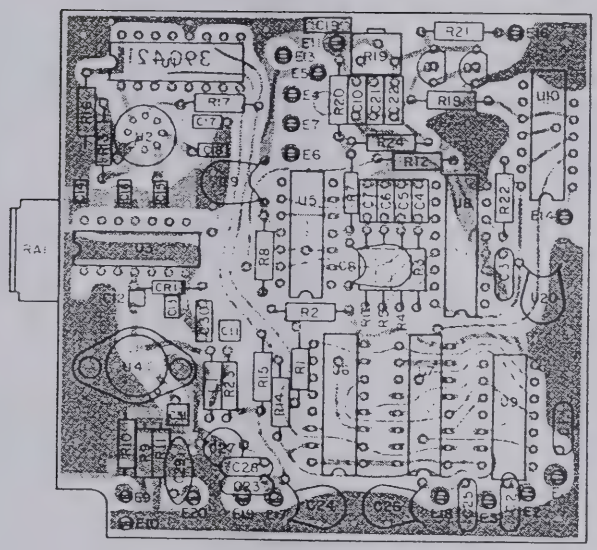


**Figure B-8. Type 390421-1 UHF Variable Divider (A3A1A3A1), Location of Components**

B.9.1.1.3.2 ***Type 796719-1 UHF Oscillator Assembly*** REF DESIG PREFIX **A3A1A3A2**

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| | Revision A | | | | |
| A1 | UHF Oscillator PC Assembly | 1 | 381473-1 | 14632 | |
| C1 | Capacitor, Feedthru: 1000 pF, 100 V | 6 | 54-790-018 | 33095 | |
| C2 Thru C6 | Same as C1 | | | | |
| J1 | Connector, Receptacle | 1 | 1012-1511-000 | 19505 | |
| R1 | Resistor, Fixed, Film: 22 kΩ, 5%, 1/8 W | 4 | CF1/8-22K/J | 09021 | |
| R2 Thru R4 | Same as R1 | | | | |

### B.9.1.1.3.2.1 Type 381473-1 UHF Oscillator PC Assembly REF DESIG PREFIX A3A1A3A2A1

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| | Revision A | | | | |
| C1 | P/O PC Board | 4 | | | |
| C2 | Capacitor, Ceramic: 1.5 pF, ±.1 pF, 500 V | 3 | ATC175B1R5BP500X | 29990 | |
| C3 | Capacitor, Variable, Air: .4-2.5 pF, 500 V | 4 | 27283 | 91293 | |
| C4 | Capacitor, Ceramic: 5.6 pf, ±.1 pF, 500 V | 2 | ATC175B5R6BP500X | 29990 | |
| C5 | Same as C1 | | | | |
| C6 | Same as C2 | | | | |
| C7 | Same as C3 | | | | |
| C8 | Same as C4 | | | | |
| C9 | Same as C1 | | | | |
| C10 | Same as C2 | | | | |
| C11 | Same as C3 | | | | |
| C12 | Capacitor, Ceramic: 4.7 pF, ±.1 pF, 500 V | 1 | ATC175B4R7BP500X | 29990 | |
| C13 | Same as C1 | | | | |
| C14 | Capacitor Ceramic: 1.0 pF, ±.1 pF, 500 V | 1 | ATC175B1R0BP500X | 29990 | |
| C15 | Same as C3 | | | | |
| C16 | Capacitor, Ceramic: 3.9 pF, ±.1 pF, 500 V | 1 | ATC175B3R9BP500X | 29990 | |
| C17 | Capacitor, Electrolytic, Tantalum: 22 µF, 20%, 15 V | 1 | TMM-S-226M-015R | 04222 | |
| C18 | Capacitor, Ceramic, Monolithic: 2.0 pF, ±.1 pF, 100 V | 2 | 100-100-NPO-209B | 51642 | |
| C19 | Capacitor, Ceramic, Monolithic: 2.4 pF, ±.1 pF, 100 V | 1 | 100-100-NPO-249B | 51642 | |
| C20 | Capacitor, Ceramic, Monolithic: 1.0 pF, ±.1 pF, 100 V | 2 | 100-100-NPO-109B | 51642 | |
| C21 | Same as C20 | | | | |
| C22 | Same as C18 | | | | |
| C23 | Capacitor, Ceramic, Disk: .01 µF, 20%, 50 V | 1 | 34453-1 | 14632 | |
| CR1 | Tuning Varactor | 4 | MA-45240-31 | 96341 | |
| CR2 thru CR4 | Same as CR1 | | | | |
| CR5 | Diode | 1 | IN4449 | 80131 | |
| FB1 | Ferrite Bead | 12 | 56-590-65-4A | 02114 | |
| FB2 thru FB12 | Same as FB1 | | | | |
| L1 | Coil, Fixed | 9 | 190187-1 | 14632 | |
| L2 Thru L9 | Same as L1 | | | | |
| L10 | Coil, Fixed | 3 | 180683-1 | 14632 | |
| L11 | Same as L10 | | | | |
| L12 | Same as L10 | | | | |
| Q1 | Transistor | 4 | MMBT2222A | 04713 | |
| Q2 | Transistor | 4 | 841269 | 14632 | |
| Q3 | Same as Q2 | | | | |
| Q4 | Same as Q1 | | | | |

REF DESIG PREFIX **A3A1A3A2A1**

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| Q5 | Same as Q2 | | | | |
| Q6 | Same as Q1 | | | | |
| Q7 | Same as Q2 | | | | |
| Q8 | Same as Q1 | | | | |
| Q9 | Transistor | 1 | MMBT3906 | 04713 | |
| R1 | Resistor, Fixed, Film: 1.8 kΩ, 5%, 1/8 W | 6 | C3-1.8K-5PCT | 24546 | |
| R2 | Resistor, Fixed, Film: 130Ω, 5%, 1/4 W | 1 | CF1/4-130 OHMS/J | 09021 | |
| R3 | Same as R1 | | | | |
| R4 | Resistor, Fixed, Film: 150Ω, 5%, 1/4 W | 1 | CF1/4-150 OHMS/J | 09021 | |
| R5 | Same as R1 | | | | |
| R6 | Resistor, Fixed, Film: 180Ω, 5%, 1/4 W | 1 | CF1/4-180 OHMS/J | 09021 | |
| R7 | Same as R1 | | | | |
| R8 | Resistor, Fixed, Film: 110Ω, 5%, 1/8 W | 1 | CF1/4-110 OHMS/J | 09021 | |
| R9 | Same as R1 | | | | |
| R10 | Resistor, Fixed, Film: 3.3K, 5%, 1/8 W | 1 | C3-3.3K-5PCT | 24546 | |
| R11 | Same as R1 | | | | |
| R12 | Resistor, Fixed, Film: 18 kΩ, 5%, 1/8 W | 1 | C3-18K-5PCT | 24546 | |
| R13 | Not Used | | | | |
| R14 | Resistor, Fixed, Film: 100Ω, 5%, 1/8 W | 2 | C3-100R-5PCT | 24546 | |
| R15 | Same as R14 | | | | |
| T1 | Power Divider | 2 | 281926-1 | 14632 | |
| T2 | Same as T1 | | | | |

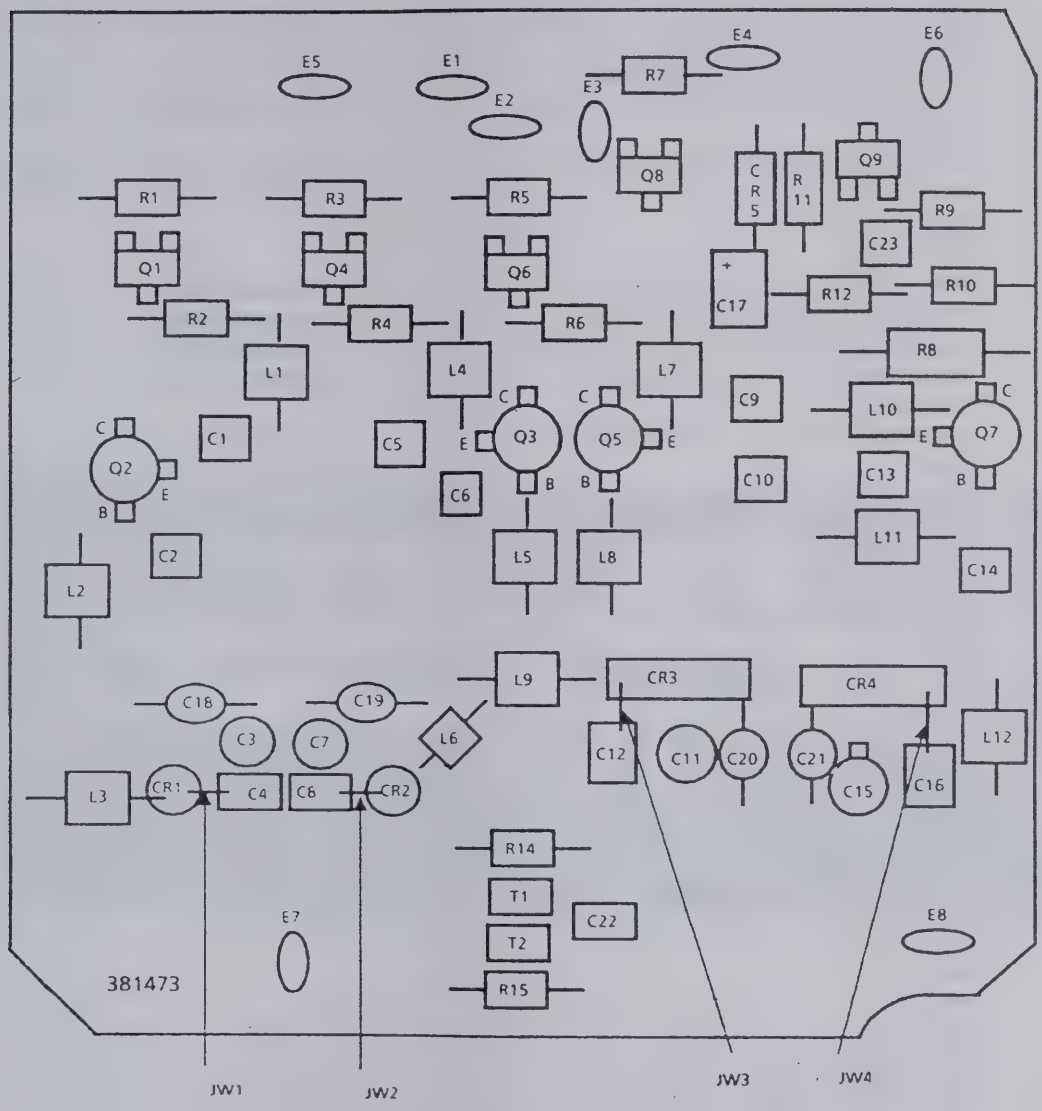



**Figure B-9. Type 381473-1 UHF Oscillator PC Assembly (A3A1A3A2A1), Location of Components**

## B.9.2 TYPE 280899-3 RF SWITCH

REF DESIG PREFIX **A3A2**

| | | | | |
|---|---|---|---|---|
| | Revision C1 | | | |
| C1 | Capacitor, Ceramic, Chip: 4.3 pF, ±0.5 pF, 500 V | 2 | ATC700B4R3DP500X | 29990 |
| C2 | Capacitor, Ceramic, Chip: 2200 pF, 5%, 50 V | 2 | C1005C222J5GAC | 31433 |
| C3 | Capacitor, Ceramic, Chip: 0.05 µF, 10%, 50 V | 2 | C1210C503K5RAC | 31433 |
| C4 | Capacitor, Ceramic, Chip: 8.2 pF, ±0.25 pF, 500 V | 2 | ATC700B8R2CP500X | 29990 |
| C5 | Same as C1 | | | |
| C6 | Capacitor, Ceramic, Disc: 1000 pF, 10%, 100 V | 2 | 8121-100-X7R0-102K | 59660 |
| C7 | Same as C3 | | | |
| C8 | Same as C6 | | | |
| C9 | Same as C2 | | | |
| C10 | Capacitor, Ceramic, Chip: 13 pF, 2%, 500 V | 1 | ATC700B130GP500X | 29990 |
| C11 | Capacitor, Ceramic, Chip: 10 pF, 2%, 500 V | 1 | ATC700B100GP500X | 29990 |
| C12 | Capacitor, Ceramic, Chip: 4.7 pF, ±0.25 pF, 500 V | 1 | ATC700B4R7CP500X | 29990 |
| C13 | Capacitor, Ceramic, Chip: 33 pF, 2%, 500 V | 1 | ATC700B330GP500X | 29990 |
| C14 | Same as C4 | | | |
| C15 | Capacitor, Ceramic, Chip: 0.5 pF, ±0.1 pF, 500 V | 1 | ATC100B0R5BP500X | 29990 |
| CR1 | Diode | 5 | 841320 | 14632 |
| CR2 | | | | |
| Thru | Same as CR1 | | | |
| CR5 | | | | |
| E1 | Terminal, Forked | 2 | 140-1941-02-01 | 71279 |
| E2 | Same as E1 | | | |
| FB1 | Ferrite Bead | 6 | 56-590-65-HA | 02114 |
| FB2 | | | | |
| Thru | Same as FB1 | | | |
| FB6 | | | | |
| J1 | Connector, Receptacle | 2 | 1110-7511-000 | 19505 |
| J2 | Not Used | | | |
| J3 | Same as J1 | | | |
| L1 | Coil, Fixed | 2 | 170160-1 | 14632 |
| L2 | Same as L1 | | | |
| L3 | Coil, Fixed | 3 | 170134-1 | 14632 |
| L4 | Same as L3 | | | |
| L5 | Same as L3 | | | |
| L6 | Coil, Fixed | 1 | 170158-1 | 14632 |
| L7 | Coil, Fixed | 1 | 170159-1 | 14632 |
| R1 | Resistor, Fixed, Composition: 560Ω, 5%, 1/8 W | 2 | RCR05G561JS | 81349 |
| R2 | Resistor, Fixed, Composition: 680Ω, 5%, 1/4 W | 1 | RCR07G681JS | 81349 |
| R3 | Same as R1 | | | |

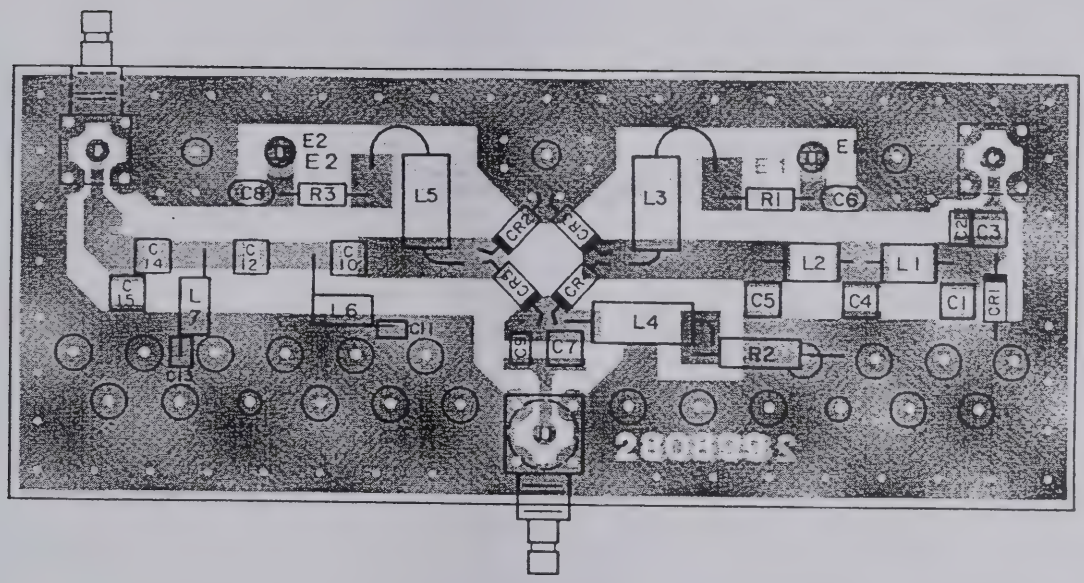
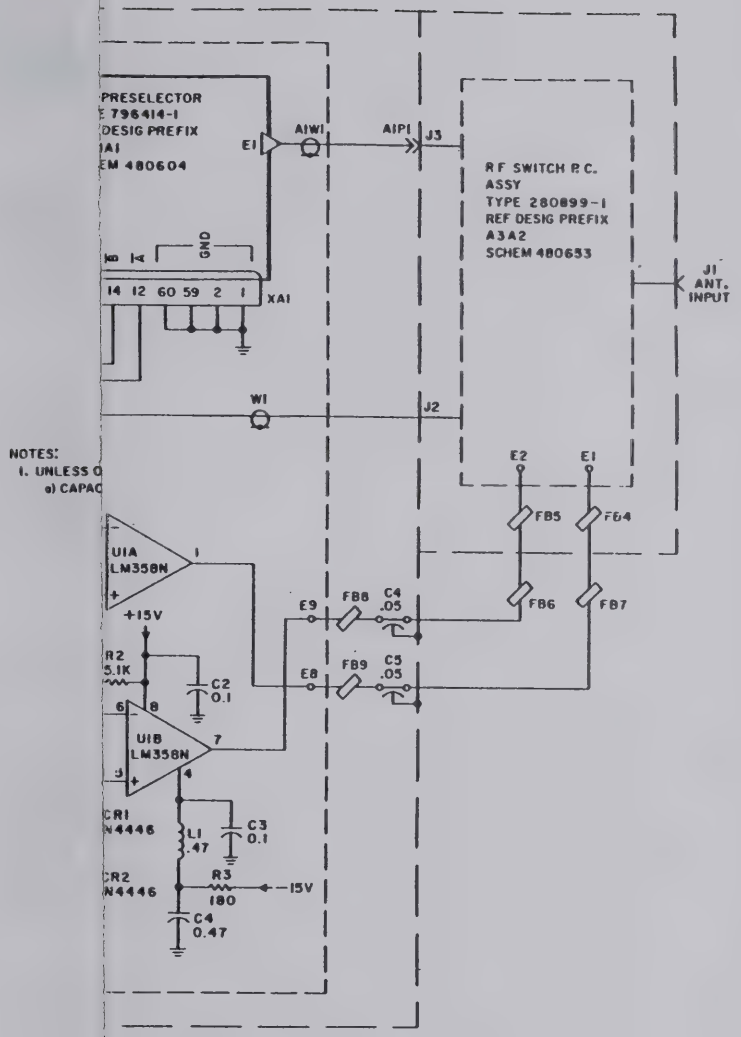



**Figure B-10. Type 280899-3 RF Switch (A3A2), Location of Components**

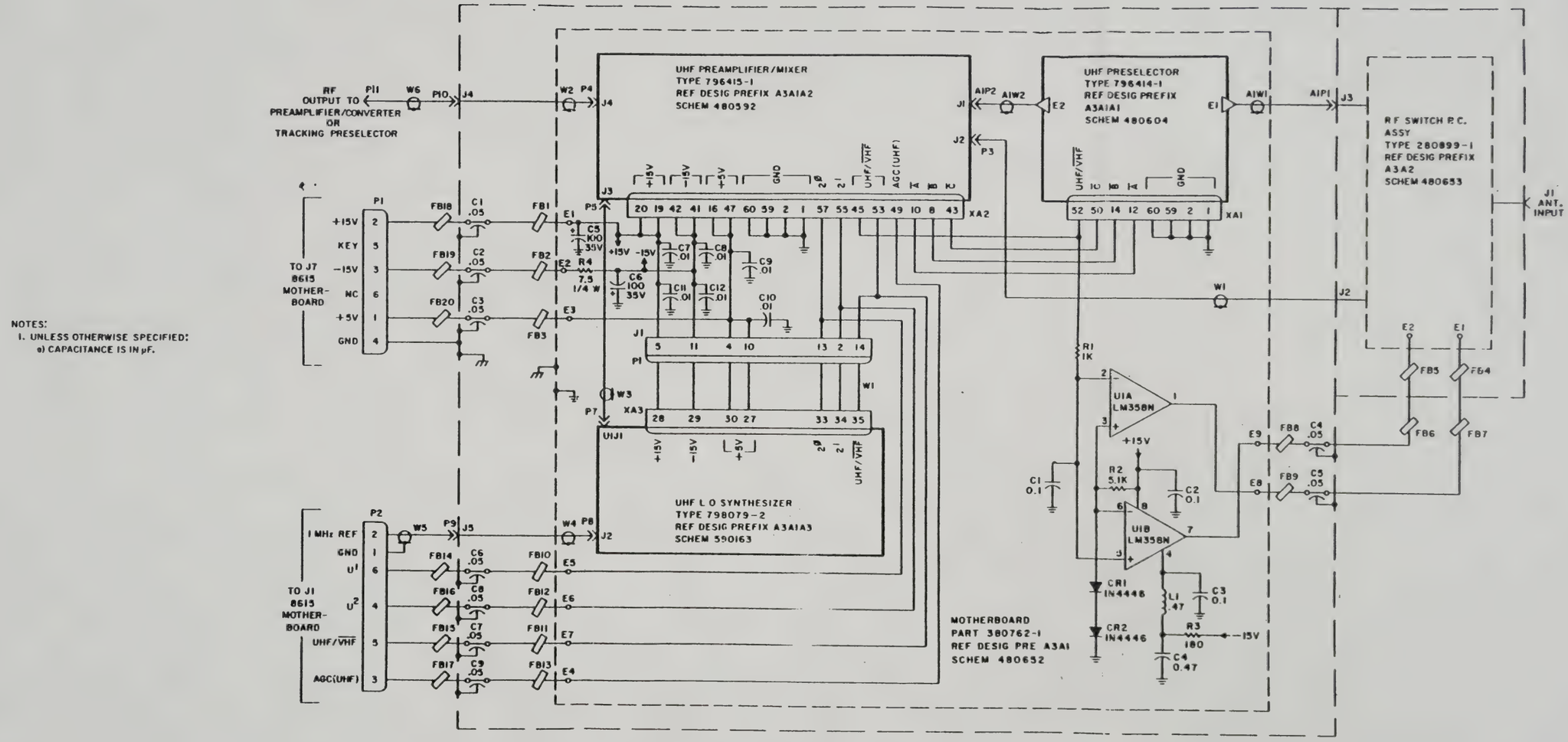
**NOTES**




FO-B-1. Type 380762-1 Motherboard (A3A1), Schematic Diagram 480651

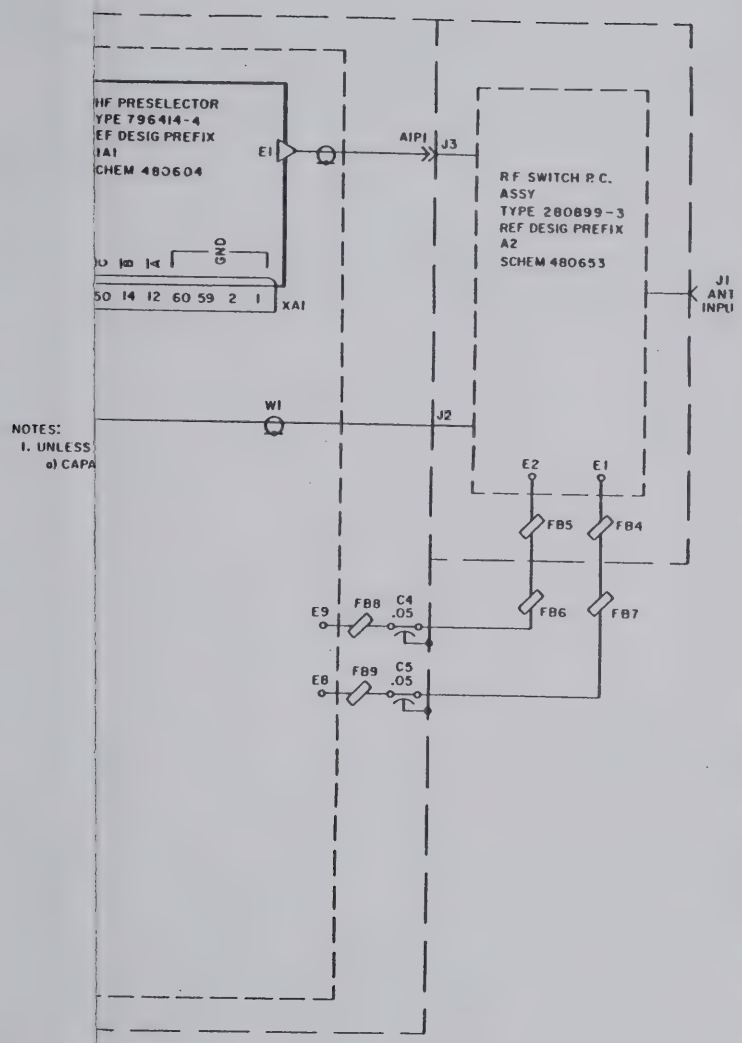
FP-B-1/(FP-B-2 blank)

**NOTES**




NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) CAPACITANCE IS IN μF.

FO-B-1. Type 380762-1 Motherboard (A3A1), Schematic Diagram 480651



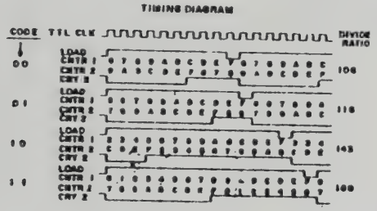

Type 796456-3 Frequency Extender Main Chassis (A3), Schematic Diagram 480649

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS IN pF.
2. DIFFERENCE BETWEEN TYPES IS MECHANICAL ONLY.

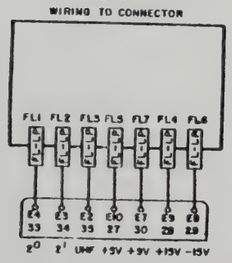
TABLE I

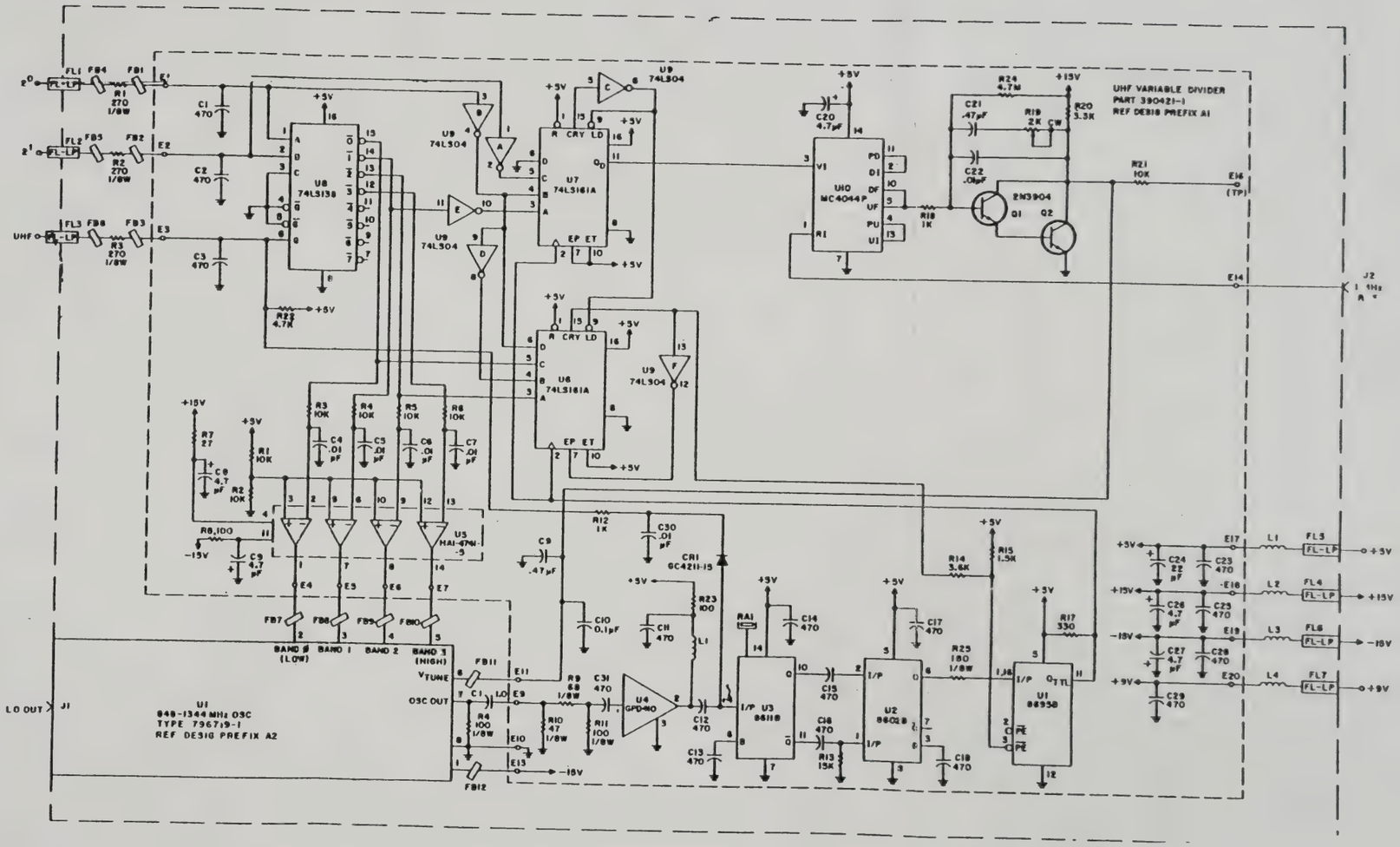
| INPUTS UHF $2^1$ $2^0$ | | CONTR 1 D C B A | CONTR 2 D C B A |
|---|---|---|---|
| 1 0 0 | → | 0 1 1 0 | 1 0 0 1 |
| 1 0 1 | → | 0 1 0 1 | 0 1 1 1 |
| 1 1 0 | → | 0 0 1 0 | 1 1 0 0 |
| 1 1 1 | → | 0 0 0 0 | 0 1 1 1 |

TIMING DIAGRAM




DETAIL A
WIRING TO CONNECTOR




FO-B-4. Type 798079-2 UHF LO Synthesizer (A3A1A3), Schematic Diagram 590163

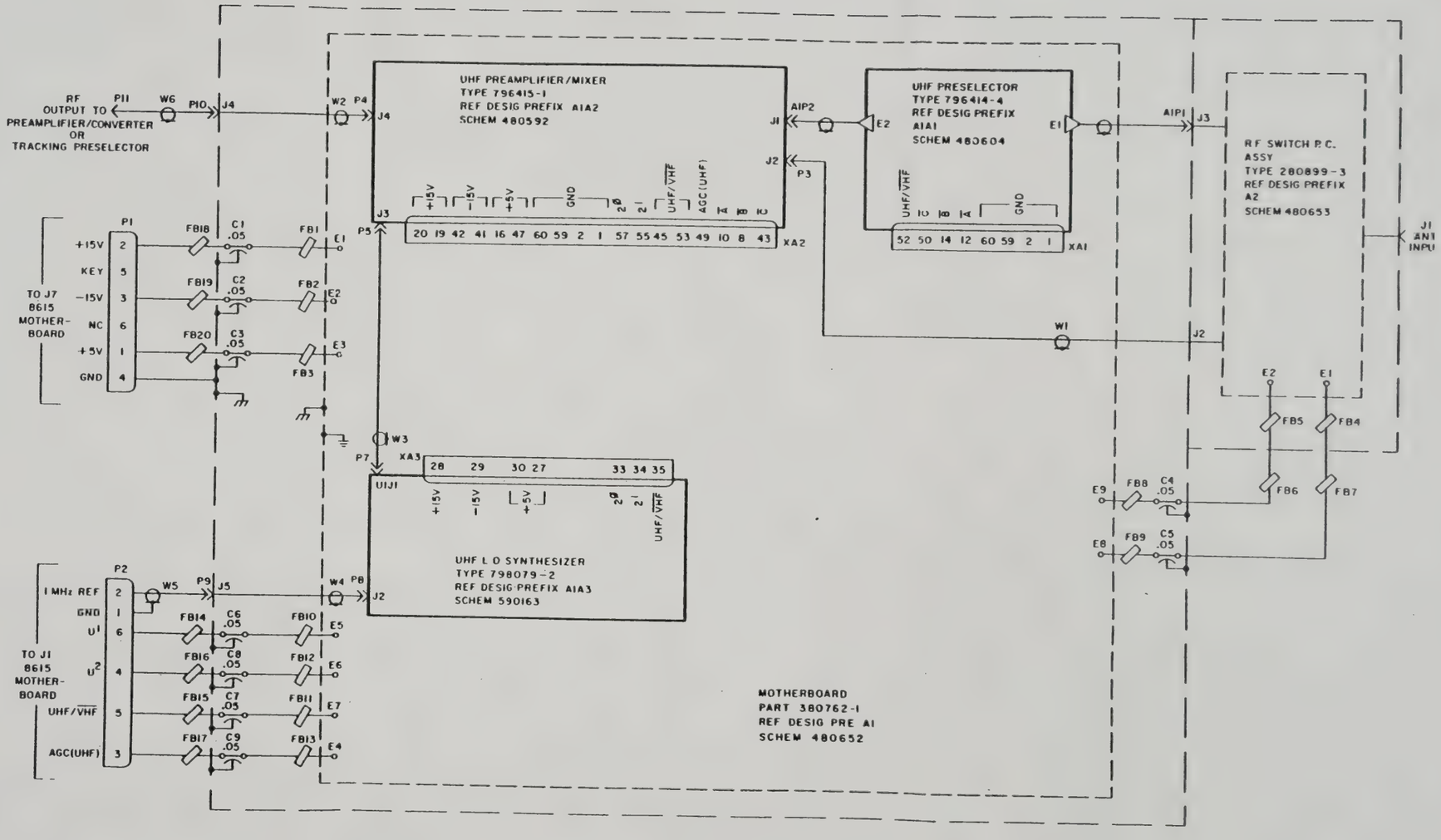
# WJ-8615 RECEIVER

## APPENDIX C

## FAST SWITCHING 2nd LO SYNTHESIZER OPTION

BAE SYSTEMS
ADVANCED SYSTEMS
700 QUINCE ORCHARD ROAD
GAITHERSBURG, MARYLAND 20878

March 2001




NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) CAPACITANCE IS IN μF.

FO-B-7. Type 796456-3 Frequency Extender Main Chassis (A3), Schematic Diagram 480649

# WJ-8615 RECEIVER

# APPENDIX C

# FAST SWITCHING 2nd LO SYNTHESIZER OPTION

BAE SYSTEMS
ADVANCED SYSTEMS
700 QUINCE ORCHARD ROAD
GAITHERSBURG, MARYLAND 20878

March 2001

## PROPRIETARY STATEMENT

This document and subject matter disclosed herein are proprietary items to which BAE SYSTEMS retains the exclusive right of dissemination, reproduction, manufacture and sale.

This document is provided to the individual or using organization for their use alone in the direct support of the associated equipment unless permission for further disclosure is expressly granted in writing.

## WARRANTY

Seller warrants for a period of one year from the date of shipment, unless a different period has been agreed upon and incorporated into the Contract, that the products delivered or services rendered will conform to the specifications and be free from defects in workmanship and materials. THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF MERCHANTABILITY, FITNESS FOR PURPOSE, OR OTHER WARRANTIES OR GUARANTIES OF ANY KIND OR DESCRIPTION, WHETHER STATUTORY, EXPRESS, OR IMPLIED. If the goods delivered or services performed fail to conform to the warranty stated in this clause, Seller will correct the nonconformity at its expense by such repair, adjustment, modification, or replacement of the goods or services as Seller deems expedient. THE FOREGOING REMEDY OF BUYER FOR ANY FAILURE OF THE GOODS OR SERVICES TO MEET ANY WARRANTY IS EXCLUSIVE. BUYER EXPRESSLY AGREES THAT THE LIABILITY OF SELLER UNDER ANY WARRANTY SHALL NOT INCLUDE DAMAGE TO OUR LOSS OF PROPERTY OTHER THAN THE GOODS COVERED BY THE CONTRACT; LOSS OF PROFITS OR REVENUE; INCREASED COSTS OF ANY KIND; CLAIMS OF CUSTOMERS OF BUYER; OR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES. As to goods or components where the customer has funded the repair, Seller will warrant as limited above, the repaired portion of the unit for three months from the date of reshipment. EQUIPMENT OR PARTS DESCRIBED AS BEING MANUFACTURED BY OTHERS ARE SOLD BY SELLER AS IS and Buyer must look to the respective manufacturer for any and all claims with regard to said equipment or parts.

## TABLE OF CONTENTS

## APPENDIX C

## FAST SWITCHING 2nd LO SYNTHESIZER OPTION


| Paragraph | | Page |
|---|---|---|
| C.1 | General | C-1 |
| C.2 | Selection | C-1 |
| C.3 | Circuit Description | C-1 |
| C.4 | List of Manufacturers | C-3 |
| C.5 | Provisioning Note - Inconsistencies In Part numbering Conventions | C-4 |
| C.6 | Replacement Parts List | C-4 |
| C.6.1 | Type 776012-1 Fast Switching 2nd LO Synthesizer | C-5 |


## FOLDOUTS


| Foldout | | Page |
|---|---|---|
| FO-C-1 | Type 776012-1, Fast Switching 2nd LO Synthesizer (A1A6), Schematic Diagram 580478 (G) | FP-C-1 |

**THIS PAGE INTENTIONALLY LEFT BLANK**

# APPENDIX C

# FAST SWITCHING 2ND LO SYNTHESIZER OPTION

## C.1 GENERAL

Fast Switching 2nd LO Synthesizer (A1A6) Type 776012-1 increases the 2nd LO tuning speed from 50 milliseconds to 15 milliseconds maximum (to within 10 kHz), and provides a 2nd LO output frequency, from 531.1600 MHz to 536.1500 MHz. The 2nd LO frequencies, from A1A6, are applied to connector J2 of the Preamplifier/Converter (A1A13). The 2nd LO output level is approximately +2 dBm. 2nd LO frequencies are used to provide the receiver with a tuning resolution of 10 kHz. Fast Switching 2nd LO Synthesizer Type 776012-1 provides the following features:

- Improved temperature stability when used with the SSL (Step/Scan/Lockout) option
- Fast Step/Scan/Lockout compatible
- Faster switching than the standard 2nd LO operation

## C.2 SELECTION

Fast Switching 2nd LO operation is selected when position 6 of switch S1, on the A1A2 module, is in the OPEN position. Access to the IEEE-488/Interrupt module (A1A2) is provided by removing the receiver top protective cover. Use the decal located on the top cover, or refer to the A1A2 location of components in **Section V** to locate the A1A2 module. Locate position 6 on switch S1. Switch S1 is the same as OPT B. Switch S1 is the switch on the left, when facing the receiver, and position 6 is the third switch position from the left. Place S1 position 6 to the OPEN position to enable FSLO.

If switch S1 is not set to support the type of 2nd LO installed in the receiver, the receiver will not operate properly. At power up, incompatibility is indicated on the front panel significant digits. To correct the error, set switch S1 position 6 to the proper setting for the 2nd LO installed and turn the receiver power off and on again. The error indication should not be indicated on the front panel display.

## C.3 CIRCUIT DESCRIPTION

Refer to **Figure C-1** for Type 776012-1 Fast Switching 2nd LO Synthesizer schematic diagram. Operation of the 2nd LO remains essentially the same for small frequency steps (less than 100 kHz). 2nd LO operation changes when a large frequency step (equal or greater than 100 kHz), is taken.

When the receiver power is turned on, U15 is turned on. With U15 turned on, transistor Q5 causes the temperature of heater HR1 to begin increasing. As the temperature of heater HR1 increases toward 40°C, feedback from thermister RT2 reduces the output from U15. Reducing the output from U15 causes Q5 to conduct less. When the heater temperature reaches 40°C, Q5 is cutoff. The heater circuit brings the VCO temperature up to the receiver operating temperature more quickly, increasing synthesizer stability during Step/Scan/Lockout operation.

For a small frequency step, the level of the FINE TUNE DISABLE line (connector pin 9) is LOW. This LOW is applied to quad electronic switches U8 and U9, allowing normal 2nd LO operation. Assuming a small frequency step has been made, 2nd LO operation is as follows. The 2nd LO VCO, consisting of W1, Q2, CR3, CR4 and their associated components, produces the 2nd LO frequency. Biasing for the VCO circuit is provided through ripple reducer Q1. Reducing ripple on the supply voltage for the VCO is required for low noise operation.

Oscillator frequencies from the VCO are coupled from Q2 to the input of buffer amplifier U14. From U14, the VCO frequency is split into two paths. One signal path is through R14 to the 2nd LO Output (J1). The other path is to the input of buffer amplifier U1. Biasing for buffer amplifiers U1 and U14 is directed through Q3 and its associated circuitry for ripple reduction.

The output from buffer amplifier U1 is directed to divide by 80/81 prescaler U2. Prescaler U2 is biased by a separate +5 V regulator (U3) for the purpose of isolation. The output frequency from U2 is applied to controller U11. Controller U11 divides the 2nd LO VCO (the variable frequency) to produce a 10 kHz variable signal. U11 also divides a reference 250 kHz signal (the reference frequency) to produce a reference 10 kHz signal. U11's internal frequency/phase comparator determines if the two signals are synchronized. If both signals do not match in frequency and phase, U11 generates an error correction voltage. Correction voltages from U11 are directed through closed contacts of electronic switch U9 to voltage driver U10. Output error correction voltages from U10 are split. One path is to connector pin 10 (FINE TUNE OUT) and the other path is RC filtered by R47-R50 and C49-C52 to eliminate the 10 kHz component. After filtering the error correction voltages are applied through closed contacts of electronic switch U8 to the 2nd LO VCO circuit. Applying an error correction voltage to the varicap diodes (CR3 and CR4) tunes the VCO in the direction required to correct the error in frequency or phase.

Taking a frequency step of 100 kHz or greater causes several changes in the operation of the 2nd LO VCO. The following paragraphs describe the changes that occur within a 3 millisecond time span.

Tuning the receiver frequency from 200 MHz to 210 MHz causes the logic level of the FINE TUNE DISABLE at connector P1 pin 9 to be driven HIGH. This HIGH is directed to electronic switches U8 and U9, closing switch contacts S1 and S2, while opening S2 and S4. Closing U8 switches S1 and S2 causes the +2 to +10 Vdc COARSE TUNE IN voltage (from connector pin 11) to bypass resistor R43. Bypassing R43, through the closed contacts of switch S1, reduces the RC time constant of R43 and C19. Reducing the RC time constant allows the coarse tune VCO frequency to change more quickly. Closing switch S1 causes the VREF to be applied out D2 (U8 pin 11), through R42 to the keep the fine tune VCO at a constant voltage.

Opening U8 switch contact S4 causes the lock detect output from U11 (pin 13) to be interrupted. This forces the 2nd LO LOCK indication at connector pin 25 to float. The Microprocessor sees a HIGH because of the pull up resistor on the Motherboard. With U8 switch S3 open, the error correction voltage from U10 is prevented from reaching the VCO loop.

Closing U9 switch contacts S1 and S2 causes the VREF at U9 pin 5 to be applied to U10 pin 3. Closing switch S2 electrically removes R5 and C57, shorting U10 pin 2 to pin 3. This makes into a voltage follower. As a voltage follower, any voltage at pin 3 is the same voltage at pin 6. The output voltage from U6 is directed to U9 (pin 2) as feedback and also through R59 to connector pin 10, the FINE TUNE OUT. This voltage is applied to the DAC (digital-to-analog converter) on the Analog/Digital (A1A4) module.

Opening U9 switch contacts S3 and S4 keeps U11's phase detector error correction voltages from being applied through U9 to U10. This prevents the error correction voltages from being directed through U8 and tuning the VCO.

After 3 milliseconds, the time provided for fast switching operation, the VCO frequency is almost on frequency. At this time the FINE TUNE DISABLE line again goes LOW, allowing the VCO loop to operate as described for small frequency steps.

The 3rd LO VCO is also contained on the Fast Switching 2nd LO VCO Synthesizer. Transistor Q4, varicap diodes CR6 and CR7, along with their associated components, make up the 3rd LO VCO. From oscillator Q4, 3rd LO VCO frequencies are directed to the input of buffer amplifier U4. LO frequencies from U4 are then split. One signal path leads to two divide-by-10 devices (U6 and U7) that reduce the VCO frequency by a factor of 100. This divided VCO frequency is then applied to connector pin 34 (2.5 MHz OUT). The other signal path is to U5, a divide-by-80/81 device. The output from U5 is applied to controller U13. Controller U13 divides the input frequency (divide by N and divide by A) to produce a 10 kHz variable frequency. Controller U13 divides the input 250 kHz (connector pin 27) to produce a 10 kHz reference frequency. U13's internal frequency/phase comparator determines the relationship of the reference and variable frequencies. Any variation in frequency or phase produces an error correction voltage that is output to U12. Output error correction voltages from U12 are filtered, to eliminate the 10 kHz component, before the tuning voltage is applied to the VCO circuit to tune the 3rd LO VCO. The 3rd LO VCO 10 kHz steps are divided by 100 to provide 100 Hz tuning resolution for the receiver.

## C.4 LIST OF MANUFACTURERS

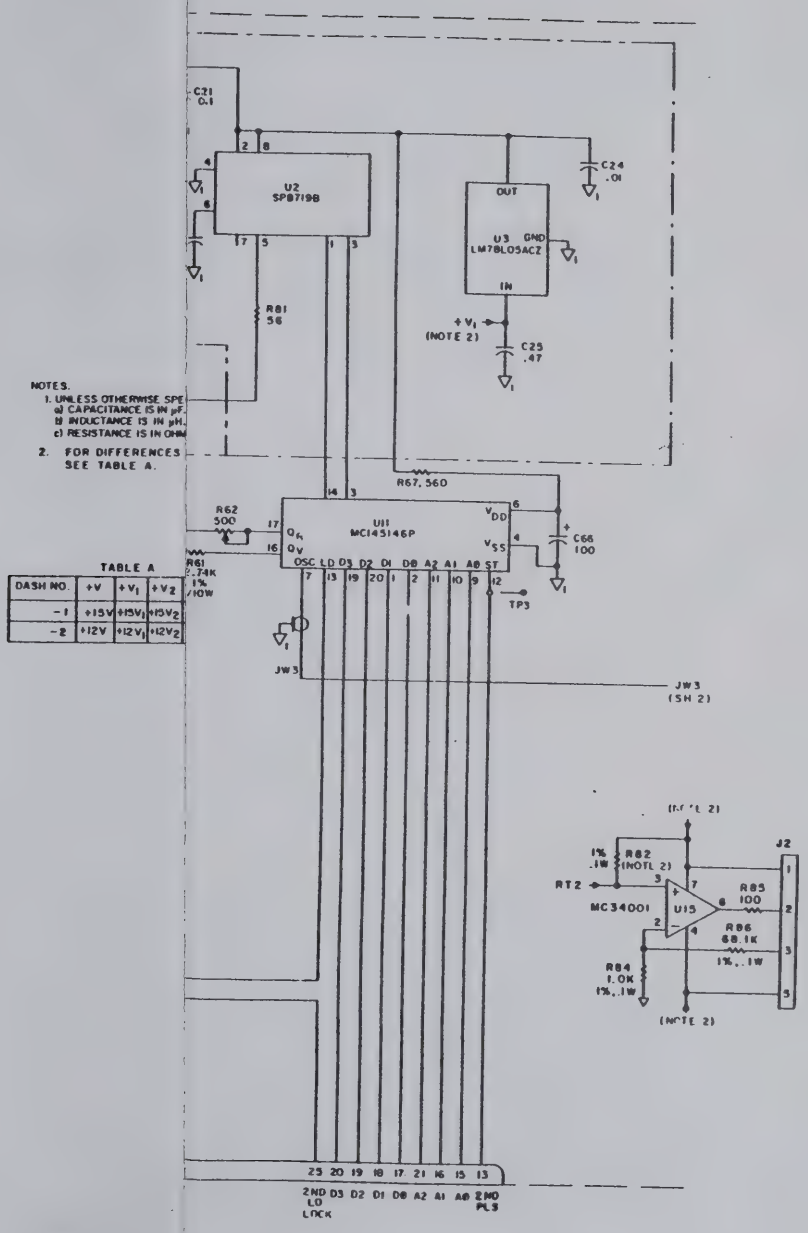
| Mfr. Code | Name and Address |
|---|---|
| 00681 | Catalyst Research Corp.<br>1421 Clarkview Rd.<br>Baltimore, MD 21209 |
| 09359 | Minco Products, Inc.<br>7300 Commerce Lane<br>Minneapolis, MI 55432 |
| 14674 | Corning Glass Works<br>Houghton Park<br>Corning, NY 14830 |
| 17217 | Gore WL and Associates<br>555 Paper Mill Rd.<br>P.O. Box 9206<br>Newark, DE 19711 |
| 4W715 | Linear Technology<br>1630 McCarthy Blvd.<br>Milpitas, CA 95035 |
| 50157 | Mid West Components Inc.<br>1981 Port City Blvd.<br>Muskegan, MI 49443 |
| 51642 | Centre Eng.<br>2820 E. College Ave.<br>State College, PA 16801 |
| 62786 | Hitachi America Ltd.<br>1800 Bering Drive<br>San Jose, CA 95122 |

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| | | | | | REF DESIG PREFIX **A1A6** |
| R29 | Resistor, Fixed, Film: 3.3 kΩ, 5%, 1/8 W | 1 | CF1/8-3.3K/J | 09021 | |
| R30 | Resistor, Fixed, Film: 1.0 kΩ, 5%, 1/8 W | 1 | CF1/8-1.0K/J | 09021 | |
| R31 | Same as R26 | | | | |
| R32 | Resistor, Fixed, Film: 120Ω, 5%, 1/8 W | 2 | CF1/8-120 OHMS/J | 09021 | |
| R33 | Same as R20 | | | | |
| R34 | Same as R32 | | | | |
| R35 | Same as R12 | | | | |
| R36 Thru R38 | Same as R10 | | | | |
| R39 | Resistor, Fixed, Film: 1.5 kΩ, 5%, 1/8 W | 1 | CF1/8-1.5K/J | 09021 | |
| R40 | Same as R6 | | | | |
| R41 | Same as R20 | | | | |
| R42 | Resistor, Fixed, Film: 68 kΩ, 5%, 1/8 W | 1 | CF1/8-68K/J | 09021 | |
| R43 | Resistor, Fixed, Film: 47 kΩ, 5%, 1/8 W | 2 | CF1/8-47K/J | 09021 | |
| R44 | Same as R19 | | | | |
| R45 | Same as R26 | | | | |
| R46 | Same as R26 | | | | |
| R47 | Resistor, Fixed, Film: 12 kΩ, 5%, 1/8 W | 1 | CF1/8-12K/J | 09021 | |
| R48 | Same as R2 | | | | |
| R49 | Same as R6 | | | | |
| R50 | Same as R8 | | | | |
| R51 Thru R53 | Same as R26 | | | | |
| R54 | Resistor, Fixed, Film: 390 kΩ, 5%, 1/8 W | 2 | CF1/8-390K/J | 09021 | |
| R55 | Resistor, Fixed, Film: 3.32 kΩ, 1%, 1/10 W | 2 | RN55C3321F | 81349 | |
| R56 | Same as R55 | | | | |
| R57 | Same as R26 | | | | |
| R58 | Same as R54 | | | | |
| R59 | Same as R43 | | | | |
| R60 | Same as R19 | | | | |
| R61 | Resistor, Fixed, Film: 2.74 kΩ, 1%, 1/10 W | 1 | RN55C2741F | 81349 | |
| R62 | Same as R23 | | | | |
| R63 | Resistor, Fixed, Film: 3.0 kΩ, 5%, 1/8 W | 1 | CF1/8-3.0K/J | 09021 | |
| R64 | Same as R18 | | | | |
| R65 | Resistor, Variable, Film: 1 kΩ, 10%, 1/4 W | 2 | 326W1-102 | 80294 | |
| R66 | Same as R27 | | | | |
| R67 | Same as R6 | | | | |
| R68 | Same as R19 | | | | |
| R69 | Resistor, Fixed, Film: 33 kΩ, 5%, 1/8 W | 1 | CF1/8-33K/J | 09021 | |
| R70 | Same as R24 | | | | |
| R71 | Same as R2 | | | | |

REF DESIG PREFIX **A1A6**

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| R72 | Resistor, Fixed, Film: 82 kΩ, 5%, 1/8 W | 2 | CF1/8-82K/J | 09021 | |
| R73 | Same as R18 | | | | |
| R74 | Same as R18 | | | | |
| R75 | Same as R72 | | | | |
| R76 | Resistor, Fixed, Film: 4.3 kΩ, 5%, 1/8 W | 1 | CF1/8-4.3K/J | 09021 | |
| R77 | Same as R19 | | | | |
| R78 | Same as R65 | | | | |
| R79 | Same as R6 | | | | |
| R80 | Resistor, Fixed, Film: 2.43 kΩ, 1%, 1/10 W | 1 | RN55C2431F | 81349 | |
| R81 | Same as R12 | | | | |
| R82 | Resistor, Fixed, Film: 56.2 kΩ, 1%, 1/10 W | 2 | RN55C5622F | 81349 | |
| R83 | Resistor, Fixed, Film: 100 kΩ, 1%, 1/10 W | 1 | RN55C1003F | 81349 | |
| R84 | Resistor, Fixed, Film: 1.0 kΩ, 1%, 1/10 W | 1 | RN55C1001F | 81349 | |
| R85 | Same as R26 | | | | |
| R86 | Same as R82 | | | | |
| RT1 | Thermistor | 1 | 4D103 | 50157 | |
| RT2 | Thermistor | 1 | 4D101 | 50157 | |
| U1 | Amplifier | 3 | GPD-321 | 24539 | |
| U2 | Integrated/Divider | 2 | SP8719B/DG | 52648 | |
| U3 | Voltage Regulator | 1 | LM78L05ACZ | 27014 | |
| U4 | Same as U1 | | | | |
| U5 | Same as U2 | | | | |
| U6 | Integrated Circuit | 1 | SP8685B/DG | 52648 | |
| U7 | Integrated Circuit | 1 | SP8690B/DG | 52648 | |
| U8 | Integrated Circuit | 2 | DG303CACJ | 17856 | |
| U9 | Same as U8 | | | | |
| U10 | Integrated Circuit | 2 | LT1007CN8 | 4W715 | |
| U11 | Integrated Circuit | 2 | MC145146P | 04713 | |
| U12 | Same as U10 | | | | |
| U13 | Same as U11 | | | | |
| U14 | Same as U1 | | | | |
| U15 | Integrated Circuit | 1 | MC34001P | 04713 | |
| VR1 | Diode Zener | 1 | LM329CZ | 27014 | |
| W1 | Cable Assembly, Coaxial | 1 | 280565-1 | 14632 | |

**NOTES**



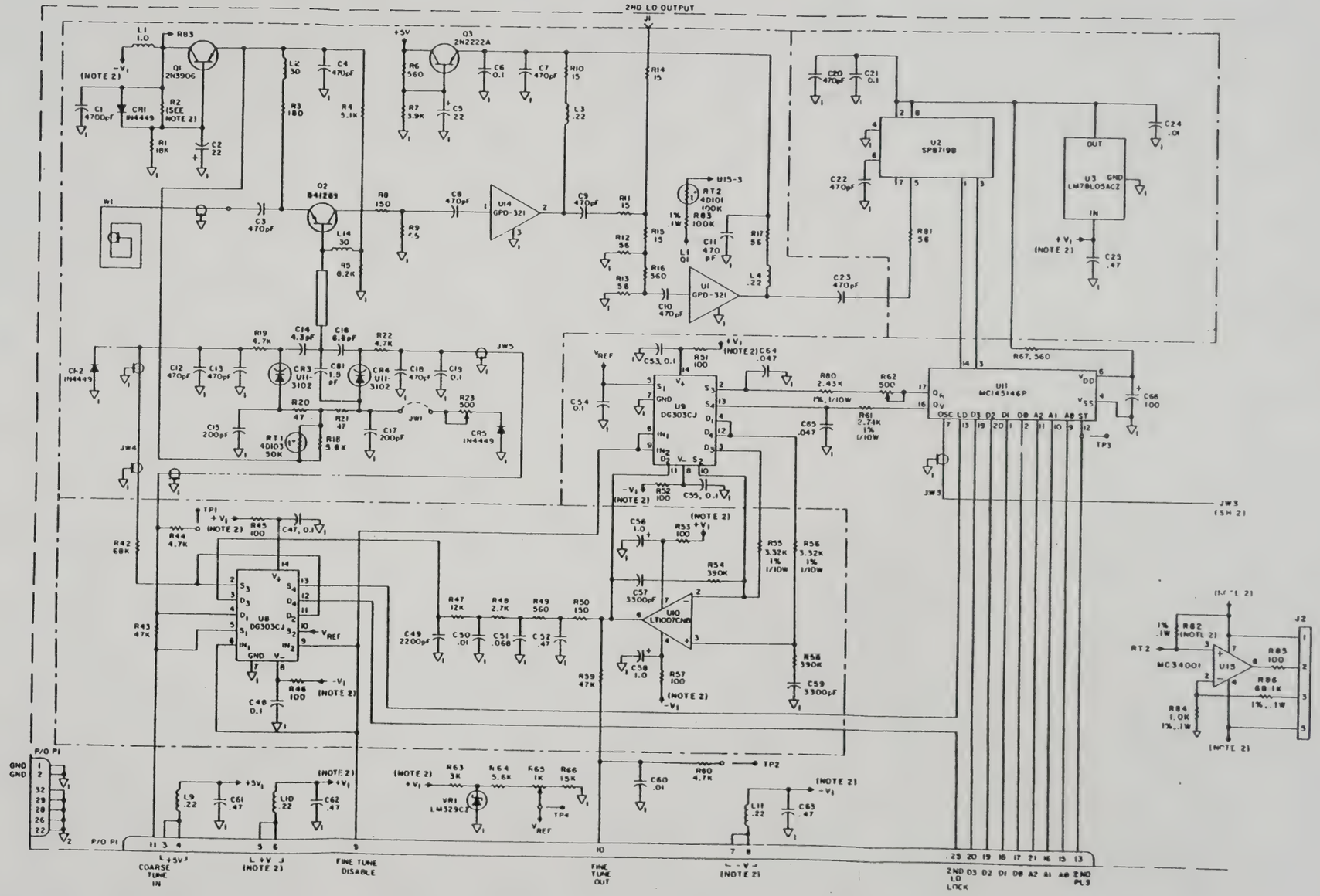

-1. Type 776012-1, Fast Switching 2nd LO Synthesizer (A1A6), Schematic Diagram 580478 (G)

**NOTES**

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) CAPACITANCE IS IN pF.
   b) INDUCTANCE IS IN µH.
   c) RESISTANCE IS IN OHMS, ± 5%, 1/8W.
2. FOR DIFFERENCES BETWEEN DASH NUMBERS, SEE TABLE A.

TABLE A

| DASH NO. | +V | +V1 | +V2 | -V | -V1 | R2 | R82 |
|---|---|---|---|---|---|---|---|
| -1 | +15V | +15V1 | +15V2 | -15V | -15V1 | 2.7K | 16.2K |
| -2 | +12V | +12V1 | +12V2 | -12V | -12V1 | 1.2K | 68.1K |




FO-C-1. Type 776012-1, Fast Switching 2nd LO Synthesizer (A1A6), Schematic Diagram 580478 (G)

# WJ-8615 RECEIVER

## APPENDIX D

## FEX-16 500-1600 MHz FREQUENCY EXTENDER OPTION

BAE SYSTEMS
ADVANCED SYSTEMS
700 QUINCE ORCHARD ROAD
GAITHERSBURG, MARYLAND 20878

March 2001

## PROPRIETARY STATEMENT

This document and subject matter disclosed herein are proprietary items to which BAE SYSTEMS retains the exclusive right of dissemination, reproduction, manufacture and sale.

This document is provided to the individual or using organization for their use alone in the direct support of the associated equipment unless permission for further disclosure is expressly granted in writing.

## WARRANTY

Seller warrants for a period of one year from the date of shipment, unless a different period has been agreed upon and incorporated into the Contract, that the products delivered or services rendered will conform to the specifications and be free from defects in workmanship and materials. THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF MERCHANTABILITY, FITNESS FOR PURPOSE, OR OTHER WARRANTIES OR GUARANTIES OF ANY KIND OR DESCRIPTION, WHETHER STATUTORY, EXPRESS, OR IMPLIED. If the goods delivered or services performed fail to conform to the warranty stated in this clause, Seller will correct the nonconformity at its expense by such repair, adjustment, modification, or replacement of the goods or services as Seller deems expedient. THE FOREGOING REMEDY OF BUYER FOR ANY FAILURE OF THE GOODS OR SERVICES TO MEET ANY WARRANTY IS EXCLUSIVE. BUYER EXPRESSLY AGREES THAT THE LIABILITY OF SELLER UNDER ANY WARRANTY SHALL NOT INCLUDE DAMAGE TO OUR LOSS OF PROPERTY OTHER THAN THE GOODS COVERED BY THE CONTRACT; LOSS OF PROFITS OR REVENUE; INCREASED COSTS OF ANY KIND; CLAIMS OF CUSTOMERS OF BUYER; OR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES. As to goods or components where the customer has funded the repair, Seller will warrant as limited above, the repaired portion of the unit for three months from the date of reshipment. EQUIPMENT OR PARTS DESCRIBED AS BEING MANUFACTURED BY OTHERS ARE SOLD BY SELLER AS IS and Buyer must look to the respective manufacturer for any and all claims with regard to said equipment or parts.

## TABLE OF CONTENTS

### WJ-8615 RECEIVER

### FEX-16 500-1600 MHz FREQUENCY EXTENDER OPTION


| Paragraph | | Page |
|---|---|---|
| D.1 | Electrical Characteristics | D-1 |
| D.2 | Mechanical Characteristics | D-1 |
| D.3 | Equipment Supplied | D-1 |
| D.4 | Equipment Required But Not Supplied | D-2 |
| D.5 | Installation | D-2 |
| D.6 | Functional Description | D-3 |
| D.7 | Detailed Circuit Description | D-6 |
| D.7.1 | Type 381812-1 Switch Assembly (A3A2) | D-6 |
| D.7.2 | Type 796769-1 UHF Preselector (A3A1A1) | D-7 |
| D.7.3 | Type 7976768-1 UHF Preamplifier/Mixer (A3A1A2) | D-8 |
| D.7.4 | Type 798079-2 UHF LO Synthesizer (A3A1A3) | D-10 |
| D.7.5 | Part 390421-1 HF Variable Divider (A3A1A3A1) | D-10 |
| D.8 | Replacement Parts List | D-12 |
| D.8.1 | Unit Numbering Method | D-12 |
| D.8.2 | Reference Designation Prefix | D-12 |
| D.8.3 | List of Manufacturers | D-12 |
| B.8.4 | Provisioning Note - Inconsistencies In Part Numbering Conventions | D-14 |
| D.8.5 | Parts List | D-15 |
| D.8.6 | WJ-8615/FEX-16 Frequency Extender Option | D-16 |
| D.8.6.1 | Type 796781-1 Frequency Extender Assembly | D-17 |
| D.8.6.1.1 | Type 381888-1 Motherboard | D-18 |
| D.8.6.1.1.1 | Type 796769-1 UHF Preselector | D-19 |
| D.8.6.1.1.2 | Type 796768-1 500-1600 MHz UHF Preamplifier/Mixer | D-22 |
| D.8.6.1.1.3 | Type 798079-2 UHF LO Synthesizer | D-25 |
| D.8.6.1.1.3.1 | Part 390421-1 UHF Variable Divider | D-26 |
| D.8.6.1.1.3.2 | Type 796719-1 UHF Oscillator Assembly | D-28 |
| D.8.6.1.1.3.2.1 | Part 381473-1 UHF Oscillator | D-29 |
| D.8.6.1.2 | Part 381812-1 RF Switch | D-31 |


## LIST OF TABLES


| Table | | Page |
|---|---|---|
| D-1 | WJ-8615/FEX-16 Frequency Bands | D-1 |
| D-2 | Band Breaks for Direction of Tuning | D-4 |
| D-3 | Receiver Operating Frequency Equations | D-5 |
| D-4 | WJ-8615/FEX-16 Tuning Scheme Examples | D-5 |
| D-5 | UHF Preselector Bandpass Selection Table | D-7 |
| D-6 | UHF Preamplifier/Mixer Control Signal Matrix | D-9 |

## TABLE OF CONTENTS (Continued)

## LIST OF ILLUSTRATIONS


| Figure | | Page |
|---|---|---|
| D-1 | UHF Preamplifier/Mixer (A3A1A2) | D-8 |


## FOLDOUTS


| Foldout | | Page |
|---|---|---|
| FO-D-1 | Type WJ-8615/FEX-16 Frequency Extender Option, Main Chassis Schematic Diagram 381918 | FP-D-1 |
| FO-D-2 | Type 796781-1 Frequency Extender Assembly (A3), Schematic Diagram 481439 | FP-D-3 |
| FO-D-3 | Type 796769-1 UHF Preselector 500-1600 MHz (A3A1A1), Schematic Diagram 580872 | FP-D-5 |
| FO-D-4 | Type 796768-1 UHF Preamplifier/Mixer (A3A1A2), Schematic Diagram 580871 | FP-D-7 |
| FO-D-5 | Type 798097-2 UHF LO Synthesizer (A3A1A3), Schematic Diagram 590163 | FP-D-9 |
| FO-D-6 | Type 796719-1 UHF Oscillator (A3A1A3A2), Schematic Diagram 481200 | FP-D-11 |
| FO-D-7 | Part 381812-1 RF Switch (A3A2) Schematic Diagram 481396 | FP-D-13 |

# WJ-8615 RECEIVER

# FEX-16 500-1600 MHz FREQUENCY EXTENDER OPTION

## D.1 ELECTRICAL CHARACTERISTICS

The WJ-8615/FEX-16 Frequency Extender option extends the upper tuning range of the WJ-8615(S1), WJ-8615D(S1), and WJ-8615P Receivers from 500 MHz to 1600 MHz. Six frequency bands are used to cover the 500 MHz to 1600 MHz extended frequency range.

Power for the WJ-8615/FEX-16 Frequency Extender option is provided by the WJ-8615 Receiver. Supply voltages (+15 Vdc, -15 Vdc and +5 Vdc) are applied to connector P1. Motherboard A3A1 (Part 381888-1) distributes these supply voltages to the subassemblies that make up the Frequency Extender option.

Connector P2 receives the control signals and the 1 MHz reference signal from the WJ-8615 Receiver. The control lines are used to select one of the six frequency extender frequency bands. These frequency bands are listed in **Table D-1**.

**Table D-1. WJ-8615/FEX-16 Frequency Bands**

| Band | Tuned Frequency |
|---|---|
| 1 | 500 - 600 MHz |
| 2 | 600 - 700 MHz |
| 3 | 700 - 900 MHz |
| 4 | 900 - 1150 MHz |
| 5 | 1150 - 1350 MHz |
| 6 | 1350 - 1600 MHz |

## D.2 MECHANICAL CHARACTERISTICS

The WJ-8615/FEX-16 Frequency Extender assembly (A3) consists of a 5.05 inch x 3.25 inch x 4.5 inch enclosed aluminum chassis with an internal motherboard (A3A1). Three sub-assemblies A3A1A1, A3A1A2, A3A1A3 are plugged into this motherboard. An additional sub-assembly the RF Switch (A3A2) is mounted to the outside of the aluminum chassis.

## D.3 EQUIPMENT SUPPLIED

The following list describes the components that are part of this option:

- Type 796781-1 WJ-8615/FEX-16 Frequency Extender
- Part 281990-1 Cable Assembly W7
- EPROMs U9 and U7 for Type 796495-X Microprocessor (A1A3)
- Part 380535-6 Cable Assembly W6

When the FEX-16 option is to be field installed in a WJ-8615P, it is not necessary to replace U7. Therefore, only U9 is provided.

## D.4 EQUIPMENT REQUIRED BUT NOT SUPPLIED

- WJ-8615(S1) Receiver
  or
- WJ-8615D(S1) Receiver
  or
- WJ-8615P Receiver

## D.5 INSTALLATION

The following steps outline the procedures for performing a field installation of the FEX-16 Option in the WJ-8615 Receiver.

1. Remove the screws securing the WJ-8615 Receiver top protective cover and remove the top cover.

2. Remove the hex nut securing connector J10 (ANTENNA) to the rear panel and push the connector inside the receiver.

3. Disconnect P10 of cable W4 (Part 280573-1) from the assembly to which it is connected. This may be another Frequency Extender version, a Tracking Preselector, or a RF Input Filter.

4. Install the new W7 cable assembly (Part 281990-1) (supplied) in the main chassis by extending the N-type connector through the rear panel cutout for connector J10. Secure the connector to the rear panel with the hex nut.

5. If another frequency extender version is currently installed in the receiver then this entire assembly (A3) must first be removed. Removal of any existing FE version can be accomplished by reversing the operations associated with steps 6 through 10 starting with step 10 and working backwards.

**NOTE**

Retain cable W4 (Part 280573-1), in the event the FEX-16 option is desired to be removed. Reinstalling this cable will allow receiver operation between 20 and 500 MHz.

6. Connect P1 from the FEX-16 option to connector J7 on the receiver Motherboard (A1).

7. Connect P2 from the FEX-16 option to connector J1 on the receiver Motherboard (A1).

8. Connect cable W6 from J4 of the FEX-16 option to J1 of the Tracking Preselector or to the RF Input Attenuator.

9. Loosely thread the four counter-sunk screws through the receiver side panel into the FEX-16 option bottom plate.

10. Ensure the FEX-16 option is properly aligned before securing the FEX-16 bucket to the receiver side panel.

11. Secure P2 (of cable W7) to connector J1 of the Frequency Extender input.

**NOTE**

When installing the FEX-16 option in a WJ-8615P, only U9 has to be replaced. Therefore, U7 is not provided for field installation of the FEX-16 option in a WJ-8615P.

12. Remove the Microprocessor subassembly (A1A3) from the receiver Motherboard (A1) and replace U9 and U7 with the replacement ICs supplied.

13. Reinstall the Microprocessor into the Motherboard.

14. Set switch S1 on the IEEE-488/Interrupt (A1A2) to the open position to enable the FEX-16 option.

15. Replace and secure the top protective cover.

16. Turn the receiver power on while simultaneously holding the CONTROL key pressed in. This places the receiver in the definitions operation.

17. Rotate the tuning wheel to display dEF On.

18. Press either CHANGE key (? or ?) until FE is displayed.

19. Verify that the FE selection displays On.

## D.6 FUNCTIONAL DESCRIPTION

The WJ-8615/FEX-16 Frequency Extender option is a 500 MHz to 1600 MHz frequency extender for use with the WJ-8615 Receiver. This frequency extender consists of Motherboard (A3A1), RF Switch (A3A2), UHF Preselector (A3A1A1), UHF Preamplifier/Mixer (A3A1A2), and UHF LO Synthesizer (A3A1A3). The Motherboard (A3A1) routes the supply voltages for all of the modules within the frequency extender, with the exception of the RF Switch.

All signals present at the receiver rear panel connector J10 (Antenna) are applied to the RF Switch (A3A2). From the RF Switch signals are routed to either the UHF Preselector (A3A1A1) or to the UHF Preamplifier/Mixer (A3A1A2). Signals routed directly to A3A1A2 by the RF Switch bypass the down-converter circuitry of the FEX-16 and are directed to the main receiver. Control lines u1, u2, and u3 determine RF signal routing and filter selection. The logic levels of these control lines determine the signal path through the RF Switch. For tuned frequencies of 499 MHz or less, the RF signal path is directed to the UHF Preamplifier/Mixer and for tuned frequencies greater than 501 MHz, RF signals are directed to the UHF Preselector. For frequencies between 499 MHz and 501 MHz, the RF signal path is determined by the direction the receiver frequency is tuned.

Tuned frequencies between 501 MHz and 1600 MHz are processed through the frequency extender. This frequency range is divided into six frequency bands listed in **Table D-1**. Within the extended tuning range there are two reversals of the final 21.4 MHz IF output spectrum. These spectrum reversals occur due to changes in the overall conversion scheme of the radio (i.e., VHF receiver plus UHF down-converter). One reversal occurs at 500 MHz (nominal) where the upper frequency limit of the main VHF receiver stops and the UHF frequency extender takes over. The other reversal occurs at 1150 MHz (nominal) which is approximately midway through the tuning range of the FEX-16 down-converter. This is the point where the conversion scheme of the extender switches from high-side local oscillator injection to low-side injection.

Due to these reversals in the final IF spectrum a tuning hysteresis of ±1 MHz around the nominal frequency of the two affected band breaks is required for the proper operation of several receiver functions, such as AFC. This tuning hysteresis at the two affected band breaks, results in the exact frequency at which the band change occurs to be different depending upon the direction in which the receiver is being tuned. **Table D-2** lists the actual band break frequencies for those which are dependent upon direction of tuning.

**Table D-2. Band Breaks for Direction of Tuning**

| Band # | Tuning Direction | Tuning Range | FEX-16 Status |
|---|---|---|---|
| 0 | Up | 20.0000 - 500.9999 MHz | "Off" |
| 0 | Down | 498.9999 - 20.0000 MHz | "Off" |
| 1 | Up | 501.0000 - 599.9999 MHz | "On" |
| 1 | Down | 599.9999 - 499.0000 MHz | "On" |
| 4 | Up | 900.0000 - 1150.9999 MHz | "On" |
| 4 | Down | 1148.9999 - 900.0000 MHz | "On" |
| 5 | Up | 1151.0000 - 1349.9999 MHz | "On" |
| 5 | Down | 1349.9999 - 1149.0000 MHz | "On" |

RF signals directed to the UHF Preselector are divided into six bands. Frequencies within these bands are directed to the UHF Preamplifier/Mixer. The UHF Preamplifier/Mixer amplifies the RF signal before being mixed with one of the following four LO frequencies:

848 MHz,
944 MHz,
1144 MHz, or
1344 MHz

These four LO signals, produced by the UHF LO Synthesizer, are mixed with the RF signal to produce a difference frequency falling within the VHF tuning range of the receiver. This down-converted signal is then directed out the FEX-16 option to the receiver for signal processing as an ordinary VHF signal. **Table D-3** lists the equations used to determine the receiver operating frequency.

**Table D-3. Receiver Operating Frequency Equations**

| Band # | Formula |
|---|---|
| 1 (500-600 MHz) | Receiver Frequency = 848 MHz - Tuned Frequency |
| 2 (600-700 MHz) | Receiver Frequency = 944 MHz - Tuned Frequency |
| 3 (700-900 MHz) | Receiver Frequency = 1144 MHz - Tuned Frequency |
| 4 (900-1150 MHz) | Receiver Frequency = 1344 MHz - Tuned Frequency |
| 5 (1150-1350 MHz) | Receiver Frequency = Tuned Frequency - 944 MHz |
| 6 (1350-1600 MHz) | Receiver Frequency = Tuned Frequency – 1144 MHz |
| N/A (> 500MHz) | Receiver Frequency = Tuned Frequency |

As an aid to the operator, **Table D-4** provides examples of the WJ-8615/FEX-16 Frequency Extender tuning scheme.

**Table D-4. WJ-8615/FEX-16 Tuning Scheme Examples**

| Band # | Tuned Frequency | Tuning Direction | Operating Frequency | IF Spectrum |
|---|---|---|---|---|
| 1 | 499.0000 | Down | 349.0000 | Upright |
| 1 | 499.0001 | Down | 348.9999 | Upright |
| 1 | 500.9999 | Down | 347.0010 | Upright |
| 1 | 501.0000 | Up or Down | 347.0000 | Upright |
| 1 | 501.0001 | Up or Down | 346.9999 | Upright |
| 1 | 599.9998 | Up or Down | 248.0002 | Upright |
| 1 | 599.9999 | Up or Down | 248.0001 | Upright |
| 2 | 600.0000 | Up or Down | 344.0000 | Upright |
| 2 | 600.0001 | Up or Down | 343.9999 | Upright |
| 2 | 699.9998 | Up or Down | 244.0002 | Upright |
| 2 | 699.9999 | Up or Down | 244.0001 | Upright |
| 3 | 700.0000 | Up or Down | 444.0000 | Upright |
| 3 | 700.0001 | Up or Down | 443.9999 | Upright |
| 3 | 899.9998 | Up or Down | 244.0002 | Upright |
| 3 | 899.9999 | Up or Down | 244.0001 | Upright |

**Table D-4. WJ-8615/FEX-16 Tuning Scheme Examples** (Continued)

| Band # | Tuned Frequency | Tuning Direction | Operating Frequency | IF Spectrum |
|---|---|---|---|---|
| 4 | 900.0000 | Up or Down | 444.0000 | Upright |
| 4 | 900.0001 | Up or Down | 443.9999 | Upright |
| 4 | 1099.9999 | Up or Down | 244.0001 | Upright |
| 4 | 1100.0000 | Up or Down | 244.0000 | Upright |
| 4 | 1100.0001 | Up or Down | 243.9999 | Upright |
| 4 | 1148.9998 | Up or Down | 195.0002 | Upright |
| 4 | 1148.9999 | Up or Down | 195.0001 | Upright |
| 4 | 1149.0000 | Up | 195.0000 | Upright |
| 4 | 1149.0001 | Up | 194.9999 | Upright |
| 4 | 1150.9998 | Up | 193.0002 | Upright |
| 4 | 1150.9999 | Up | 193.0001 | Upright |
| 5 | 1149.0000 | Down | 195.0000 | Inverted |
| 5 | 1149.0001 | Down | 194.9999 | Inverted |
| 5 | 1150.9998 | Down | 193.0002 | Inverted |
| 5 | 1150.9999 | Down | 193.0001 | Inverted |
| 5 | 1151.0000 | Up or Down | 207.0000 | Inverted |
| 5 | 1151.0001 | Up or Down | 207.0001 | Inverted |
| 5 | 1349.9998 | Up or Down | 405.9998 | Inverted |
| 5 | 1349.9999 | Up or Down | 405.9999 | Inverted |
| 6 | 1350.0000 | Up or Down | 206.0000 | Inverted |
| 6 | 1350.0001 | Up or Down | 206.0001 | Inverted |
| 6 | 1599.9998 | Up or Down | 455.9998 | Inverted |
| 6 | 1599.9999 | Up or Down | 455.9999 | Inverted |

## D.7 DETAILED CIRCUIT DESCRIPTION

### D.7.1 TYPE 381812-1 SWITCH ASSEMBLY (A3A2)

The reference designation for this subassembly is A3A2. Refer to **Foldout FO-D-7** for the Type 381812-1 RF Switch schematic diagram.

RF Switch (A3A2) Type 381812-1 receives input RF signals from the Antenna Input (J1). Received RF signals are coupled through C7 to the two filter branches. One branch, consisting of L1 and L2 and their associated components, forms the VHF (20-499 MHz) bandpass filter. Filter branch selection is accomplished via voltages from the Motherboard (A3A1) applied to E1 and E2 of the RF Switch Assembly. When the receiver tuned frequencies are from 20 to 499 MHz, a logic low Vdc is applied to E1 of the RF switch. At the same time a logic high Vdc is applied to E2. Applying a low Vdc to E1, of the RF Switch (A3A2), forward biases CR3 and allows the received RF signal to flow through the VHF filter branch and to J2 of the UHF Preamplifier/Mixer (A3A1A2). While the logic low Vdc is applied to E1, a logic high Vdc is

applied to E2. This high Vdc reverse biases CR4 and prohibits signal flow through the UHF bandpass filter branch. Tuning the receiver to frequencies from 499 to 500 MHz causes the voltages applied to E1 and E2 to be reversed. The logic high Vdc on E1 inhibits the flow of signals through the VHF branch by reverse biasing CR3. The logic low Vdc applied to E2 forward biases CR4 and permits UHF signals to be passed through the UHF bandpass filter branch.

### D.7.2 TYPE 796769-1 UHF PRESELECTOR (A3A1A1)

The reference designation for this subassembly is A3A1A1. Refer to **Foldout FO-D-3** for the Type 796769-1 UHF Preselector schematic diagram.

The Type 796769-1 UHF Preselector (A3A1A1) provides the first stage of RF preselection for the 500-1600 MHz UHF signals. This subassembly utilizes five bandpass filters (FL1 through FL5) dividing the UHF spectrum into five bands: 500-700, 700-900, 900-1150, 1150-1350, and 1350-1600 MHz. Each bandpass filter is essentially flat over its specified frequency and passes these frequencies with minimum attenuation (0.5 dB). Frequencies out of the filter bandpass are attenuated, thus improving image frequency and IF rejection. The RF signal enters the UHF preselector via P1 of cable W1 and is coupled by C1 to the PIN diode switching network comprised of CR1 through CR20. This switching network applies the signal of interest through the appropriate bandpass filter, according to the tuned frequency of the receiver. From the filter, the RF signal is coupled through C8 to the output (P2 of W2) for frequencies between 500 and 1150 MHz and C24 (P3 of W3) for frequencies between 1150 and 1600 MHz.

Switching of the RF signal through the proper filter is controlled by the Band A*, B*, C*, D*, or E* select inputs. Dependent upon the tuned frequency, the Band A*, B*, C*, D*, or E* select is placed at -10 Vdc providing a current-sink through its respective series input and output PIN diodes. When conducting, the diodes provide a minimum impedance path for the RF signal through the filter within the selected branch. The remaining select inputs are held at +15 Vdc that provides a current source for the shunt diodes in their switch branch. The series diodes in these branches are cut off, thus blocking the RF signal path. The select inputs required to activate each filter branch are illustrated in the UHF Preselector Bandpass Selection Table (**Table D-5**). Each of the select inputs is provided by the UHF Preamplifier/Mixer (A3A1A2), automatically selecting the proper filter for the tuned frequency.

**Table D-5. UHF Preselector Bandpass Selection Table**

| Select UHF/VHF | E* | D* | C* | B* | A* | Active Filter | Bandpass (MHz) |
|---|---|---|---|---|---|---|---|
| 0 | 1 | 1 | 1 | 1 | 1 | --- | --- |
| 1 | 1 | 1 | 1 | 1 | 0 | FL1 | 500 - 700 |
| 1 | 1 | 1 | 1 | 0 | 1 | FL2 | 700 - 900 |
| 1 | 1 | 1 | 0 | 1 | 1 | FL3 | 900 - 1150 |
| 1 | 1 | 0 | 1 | 1 | 1 | FL4 | 1150 - 1350 |
| 1 | 0 | 1 | 1 | 1 | 1 | FL5 | 1350 - 1600 |

0 = -10 Vdc 1 = +15 Vdc

## D.7.3 TYPE 796768-1 UHF PREAMPLIFIER/MIXER (A3A1A2)

The reference designation for this subassembly is A3A1A2. Refer to **Figures D-1** and **Foldout FO-D-4** for the Type 796768-1 UHF Preamplifier/Mixer block diagram and schematic diagram.

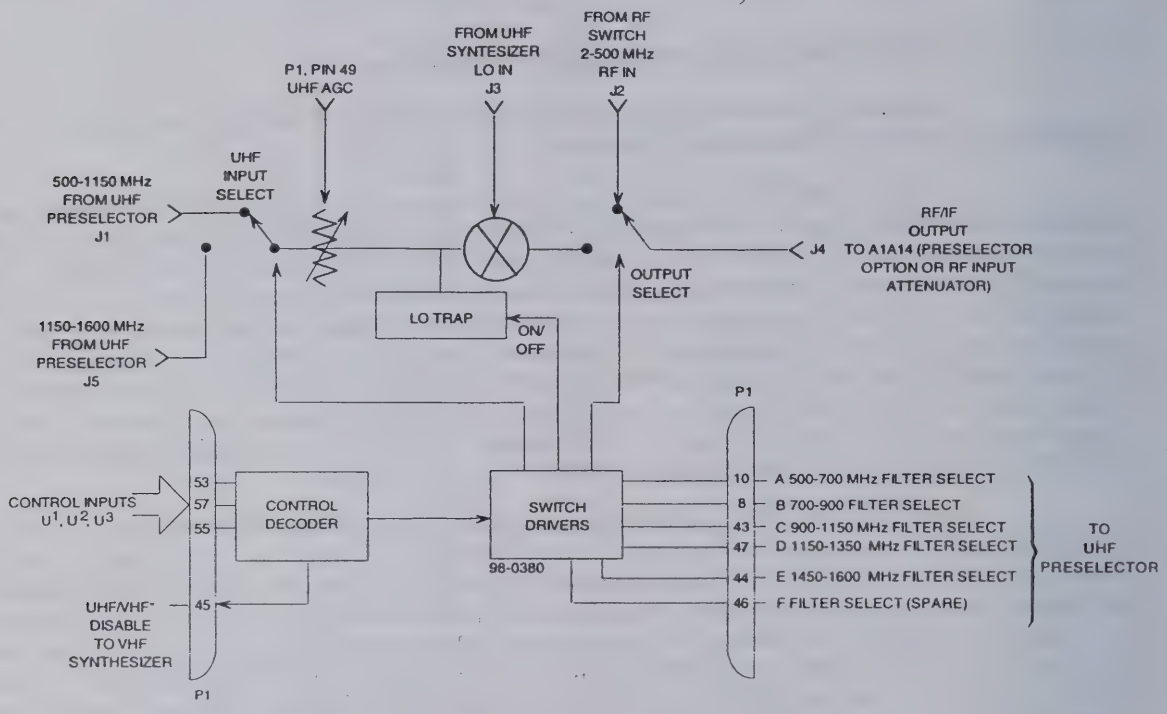



**Figure D-1. UHF Preamplifier/Mixer (A3A1A2)**

The RF signals from the Type 796769-1 UHF Preselector (A3A1A1) enter the UHF Preamplifier/Mixer (A3A1A2) via RF input connector J1, for frequencies between 500-1150 MHz and RF input connector J5, for frequencies between 1150-1600 MHz and are applied to the input of preamplifiers U1 and U2, respectively. U1 and U2 provide gain to the RF signal, increasing the signal to a sufficient level to drive the balanced mixer. The U1 or U2 output is selected based on the logic level of the u3 signal at P1 pin 53. See **Table D-6** for u1, u2, and u3 logic levels and control outputs from U8. The output of U1 (pin 4), when selected, is applied to attenuator U4 via FL1. FL1 is an 1150 MHz low-pass filter, installed in the signal path to attenuate frequencies above 1150 MHz, thus reducing image noise from U1. The output of U2 (pin 4), when selected, is applied to attenuator U4 via FL2. FL2 is a high-pass filter, installed in the signal path to attenuate frequencies below 1150 MHz, thus reducing image noise from U2. Voltage controlled attenuator U4, presents constant impedance at the output of FL1 or FL2, and provides a means of limiting the signal level to the mixer under strong signal conditions. The amount of attenuation presented by U4 is dependent on the AGC voltage provided by the AGC circuitry of the receiver applied to P1 pin 49 of the UHF Preamplifier/Mixer subassembly. This voltage varies from +10 Vdc, when weak signals are present to +2 Vdc under strong signal conditions. The attenuation presented by U4 varies between -20 dB, with an AGC voltage

of +2 Vdc, to -1.75 dB, with an AGC voltage of +10 Vdc. Operating bias is supplied by +15 Vdc applied to pin 2 and control is supplied by the AGC voltage applied to pin 1.

Balanced mixer U5 receives the RF signal from U4 and mixes it with a LO signal provided by the UHF LO Synthesizer (A3A1A3) providing a difference frequency within the VHF range. The UHF LO Synthesizer applies one of four different fixed frequencies to the mixer to divide the UHF frequency range into four frequency bands as illustrated in the Receiver Operating Frequency Equations (**Table D-3**). The Digital Control Section then tunes the VHF section of the receiver to the mixer output frequency, thus permitting the signal of interest to be further processed. The mixer output from pin 1 of U5 is then applied through a low-pass filter comprised of L6, C13 and C14. This filter suppresses high order harmonics of the UHF LO preventing their radiation from the VHF input (J2). From the low-pass filter, the RF signal is applied to the UHF branch of the UHF/VHF switch.

**Table D-6. UHF Preamplifier/Mixer Control Signal Matrix**

| Tuned Frequency | Control Signals | | | U8 Output | UHF Filter Select Low Active Signal |
|---|---|---|---|---|---|
| | u3 | u1 | u2 | | |
| < 500 MHz | 0 | 0 | 0 | Y0 = 1 | None |
| 500 – 599 MHz | 1 | 0 | 0 | Y1 = 1 | UHF Filter A – 500-700 MHz |
| 600 – 699 MHz | 1 | 1 | 0 | Y3 = 1 | UHF Filter A – 500-700 MHz |
| 700 – 899 MHz | 1 | 0 | 1 | Y5 = 1 | UHF Filter B – 700-900 MHz |
| 900 – 1149 MHz | 1 | 1 | 1 | Y7 = 1 | UHF Filter C – 900-1149 MHz |
| 1150 – 1349 MHz | 0 | 1 | 0 | Y2 = 1 | UHF Filter D – 1150-1349 MHz |
| 1350 – 1600 MHz | 0 | 0 | 1 | Y4 = 1 | UHF Filter E – 1350-160 MHz |

The UHF/VHF switch, comprised of CR5 through CR8, selects the converted UHF signal from the UHF mixer or the VHF signal from the RF Switch (A3A2), entering at J2. RF switching is controlled by the U8 decoder Y0 output via U6. This switching output is at a logic "1" when the receiver is tuned below 500 MHz or at a logic "0" when tuned to 500 MHz or above (see **Table D-6**). The Y0 "1" UHF/VHF select signal from U8 pin 15 is applied, via inverter U9A to the inverting input of switch driver U6A and also to the U6B non-inverting input. These switch drivers provide bias current for the PIN diodes in the UHF/VHF switch. With a tuned frequency below 500 MHz, the low level output of U8B provides a current source for CR6, causing it to conduct and provides a current path for the converted UHF signal to the output of the subassembly (J4). At this time the output of U6A is a "1", causing CR7 to be cut off, preventing the VHF signal from passing through the switch. With tuned frequencies 500 MHz, and above, the output logic of U6A and U6B is reversed, causing a signal path for the VHF signal through CR7 and blocking the UHF path by cutting off CR6. The Y0 "1" output also places a "0" out at P1 pin 45 via inverter U9B. This low deactivates the UHF synthesizer and selects the 20-500 MHz path in the RF Switch via A3U1A and A3U1B.

When the receiver is tuned between 500 and 1149 MHz, the u3 input at P1 pin 53 is a "1" and provides two functions (refer to **Table D-6**). This "1" is used on the Q2-Q1 circuitry to provide the operating voltage $+15V_A$ to the U1 amplifier. The "1" is also connected to the inverting input of U6C and provides forward bias for CR3, allowing it to conduct and pass the 500-1150 MHz RF signal input. Using the different states of the u1, u2, and u3 inputs as given in **Table D-6**, U8's Y1, Y3, and Y5 outputs select Filters A, B, and C, respectively. The Y1 and Y3 outputs of U8 also activate the LO Band trap via the inverting input to U10A.

When the receiver is tuned between 1150 and 1600 MHz, the P1 pin 53 input is low. This low is applied to the inverting input of U6C. The resultant high output reverse biases CR3 and prevents the 500-1150 MHz output of U1 from being applied to the U5 Mixer. The low signal is also applied to the base of Q2 via U7D pin 6. This removes the $+15V_A$ operating voltage from the U1 amplifier.

Frequencies in the 1150 to 1600 MHz range cause the Y2 or Y4 output of U8 to be at a "1" level (refer to **Table D-6**). The Y2 or Y4 output, when at a logic "1", is applied to the base of Q4 via U7D pin 11. The Q4-Q3 circuitry provides the $+15V_B$ operating voltage to the 1150-1600 MHz amplifier U2. This Y2 or Y4 "1" level is applied to the inverting input to U6D pin 13. The resultant low signal forward biases CR4 allowing the 1150-1600 MHz RF signal to be passed through to the U5 Mixer. The Y2 or Y4 logic "1" output also select the appropriate filter, UHF Filter D or UHF Filter E, via the inverting input to U19A and U19B, respectively.

### D.7.4 Type 798079-2 UHF LO Synthesizer (A3A1A3)

The reference designation for this subassembly is A3A1A3. Refer to **Foldout FO-D-5** for the Type 798079-2 UHF LO Synthesizer schematic diagram.

This subassembly consists of the UHF Variable Divider (A3A1A3A1) and the UHF Oscillator Assembly (A3A1A3A2), which together comprise the phase locked loop of the UHF LO Synthesizer. The inputs consist of the 1 MHz reference, (provided by the Synthesizer Section at J2) the UHF and UHF SEL ($2^1$, $2^0$) select inputs provided by the Digital Control Section. The output provided consists of a fixed LO frequency of 848, 944, 1144 or 1344 MHz at J1 of the 848-1344 MHz Oscillator.

### B.7.5 Part 390421-1 HF Variable Divider (A3A1A3A1)

The reference designation for this part is A3A1A3A1. Refer to **Foldout FO-D-5** for the Part 390421-1 schematic diagram.

The Part 390421-1 UHF Variable Divider (A3A1A3A1) provides the tuning control for the 848-1344 MHz Oscillator, A3A1A3A2. This subassembly decodes the UHF, $2^0$ and $2^1$ select lines, provided by the Digital Control Section, and utilizes the decoded data to select the oscillator frequency band and to preset the divide-by-n counters in the phase-locked-loop circuitry.

Control inputs to the Part 390421-1 UHF Variable Divider consist of the $2^0$, $2^1$,and UHF select inputs, provided at terminals E1, E2 and E3, respectively. The UHF input line, which is set to a logic "1" whenever the receiver is tuned above 500 MHz, is applied to the G input of U8 and to the cathode of CR1 enabling the Variable Divider circuitry. The $2^0$ and $2^1$ inputs are applied to the A and B inputs of U8 and to gates A and B of U9. U8 and U9 then decode the select inputs selecting the oscillator frequency band and presetting binary counters U7 and U6. Comparator U5 monitors the output lines of U8 and compares the logic

level at each line with a +2.5 Vdc reference provided by the voltage divider formed by R1 and R2. Each comparator in U5 provides +15 Vdc to the appropriate band select input of the oscillator assembly when its respective input (from U8) goes low, causing the desired oscillator band to be selected. The remaining outputs of U5 are held at -15 Vdc, due to the logic "1" at their inverting inputs.

A sample of the output frequency of A3A1A3A2 enters the Variable Divider at E9 and is applied to the input of amplifier U4 via the pad formed by R9, R10 and R11. U4 amplifies the oscillator frequency and applies the signal to the input of U3, via C12. Integrated circuits U3 and U2 provide divide factors of 4 and 2, respectively, providing a total prescaling factor of 8. The prescaled output is then applied to the input of a two modulus counter which further divides the signal by a factor of 10 or 11, as determined by the CRY output of counter U6. When the CRY output is at a logic "0," U1 divides by 11 and when the output is at a logic "1," U1 divides by 10. The output of U1 is then applied as a TTL clock to counters U7 and U6.

Presetable binary counters U7 and U6 function with the two modulus counter U1 providing division factors of 106, 118, 143 or 168. U7 and U6 are preset by the decoded outputs of U8 and U9 and count up from the preset until the maximum count is reached. When the maximum count is reached, a pulse is provided to the phase detector U10 and the CRY output of U7 reloads the counters, restarting the count sequence. U7 determines the total number of counts in each count sequence and U6 determines the number of times U1 divides by 11 or 10.

For example, when a LO frequency of 848 MHz is selected, U7 is preset to "6" and U6 is preset to "9." The total count sequence continues until U7 counts up from "6" to its maximum of "15" and then resets (10 counts). Simultaneous with the count of U7, U6 counts up from its preset of "9" to its maximum of "15" (6 counts). When U6 reaches "15" the CRY output is set to 1 and U6 counting halts until the preset is reloaded. During the first 6 counts (while U6 is counting) U1 divides by a factor of 11. For the remaining 4 counts (until U7 reaches its maximum count), U1 divides by a factor of 10. The total count sequence provides a divide factor of 106 (11x6) + (10x4). This, combined with the division factor of 8 by the prescaler, divides the oscillator output frequency by a factor of 848.

The output of U7 is applied to the phase detector (U10), where the divided signal is compared with the 1 MHz reference signal, provided by the Synthesizer Section of the receiver. The phase detector compares the frequency and phase of the two signals and generates an output representing the difference between the signals. This output is integrated by the loop filter, comprised of Q1, Q2 and associated components, to produce a tuning voltage which retunes the oscillator until the divided signal and the reference signal are equal in both frequency and phase. R18 and C22 determine the bandwidth of the loop filter, and C21 and R19 permit bandwidth adjustment.

## D.8 REPLACEMENT PARTS LIST

### D.8.1 UNIT NUMBERING METHOD

The unit numbering method of assigning reference designations (electrical symbol numbers) has been used to identify assemblies, subassemblies, (and modules) and parts. An example of the unit numbering method follows:

| Subassembly Designation A1 | R1 Class and No. of Item |
|---|---|
| Identify from right to left as: | First (1) resistor (R) of<br>First (1) subassembly (A) |

As shown on the main chassis schematic, components which are an integral part of the main chassis have no subassembly designation.

### D.8.2 REFERENCE DESIGNATION PREFIX

Partial reference designations have been used on the equipment and on the illustrations in this manual. The partial reference designations consist of the class letter(s) and identifying item number. The complete reference designations may be obtained by placing the proper prefix before the partial reference designations. Reference Designation Prefixes are provided on drawings and illustrations in parentheses within the figure titles.

### D.8.3 LIST OF MANUFACTURERS

| Mfr. Code | Name and Address | Mfr. Code | Name and Address |
|---|---|---|---|
| 00779 | AMP, Inc.<br>P. O. Box 3608<br>Harrisburg, PA 17105 | 04713 | Motorola Semiconductors<br>5005 East McDowell Road<br>Phoenix, AZ 85008 |
| 01295 | Texas Instruments, Inc.<br>13500 N. Central Expressway<br>Dallas, TX 75231 | 07263 | Fairchild Semiconductors<br>464 Ellis Street<br>Mountain View, CA 94042 |
| 02113 | Coilcraft, Inc.<br>1102 Silver Lake Road<br>Cary, IL 60013 | 09021 | Airco, Incorporated<br>Airco Electronics<br>Bradford, PA 16701 |
| 02114 | Amperex Electronic Corp.<br>5083 Kings Highway<br>Saugerties, NY 12477 | 12515 | Teledyne Thermatics<br>Hwy 301 South<br>P. O. Box 909<br>Elm City, NC 27822 |

| Mfr. Code | Name and Address |
|---|---|
| 12969 | Unitrode Corp.<br>5 Forbes Road<br>Lexington, MA 02173 |
| 14482 | Watkins-Johnson Company<br>3333 Hillview Avenue<br>Palo Alto, CA 94304 |
| 14632 | BAE SYSTEMS<br>Advanced Systems<br>700 Quince Orchard Road<br>Gaithersburg, MD 20878 |
| 14674 | Corning Glass Works<br>Houghton Park<br>Corning, NY 14830 |
| 16179 | Omni-Spectra, Inc.<br>21 Continental Blvd.<br>Merrimack, NH 03054 |
| 19505 | Applied Engineering Products<br>300 Seymour Avenue<br>Derby, CT 06418 |
| 24539 | Avantek, Inc.<br>3175 Bowers Avenue<br>Santa Clara, CA 95051 |
| 24546 | Corning Glass Works<br>550 High Street<br>Bradford, PA 16701 |
| 25088 | Siemens America, Inc.<br>186 Wood Avenue<br>S. Iselin, NJ 08830 |
| 27014 | National Semiconductor Corp.<br>2950 San Ysidro Way<br>Santa Clara, CA 95051 |
| 27956 | Relcom<br>3333 Hillview<br>Palo Alto, CA 94304 |
| 29990 | American Technical Ceramics<br>1 Norden Lane<br>Huntington Station, NY 11746 |
| 31433 | Union Carbide Corp.<br>Hwy. 276 S.E.<br>P. O. Box 5928<br>Greenville, SC 29606 |
| 33095 | Spectrum Control, Inc.<br>152 E. Main Street<br>Fairview, PA 16415 |
| 34371 | Harris Semiconductor Division<br>P. O. Box 883<br>Melbourne, FL 32901 |
| 50101 | Frequency Sources, Inc.<br>16 Maple Road<br>South Chelmsford, MA 01824 |
| 51642 | Centre Engineering<br>2830 E. College Avenue<br>State College, PA 16801 |
| 52648 | Plessey Memories, Inc.<br>DBA Plessey Semiconductors<br>1674 McGraw Avenue<br>Irvine, CA 92714 |
| 54583 | TDK Electronics Corporation<br>755 Eastgate Blvd.<br>Garden City, NY 11530 |
| 56289 | Sprague Electric Company<br>87 Marshall Street<br>North Adams, MA 01247 |
| 57856 | Aero American, Inc.<br>7830 Balboa Blvd.<br>Van Nuys, CA 91406 |
| 59660 | Tusonix, Inc.<br>2155 N. Forbes Blvd.<br>Suite 107<br>Tuscon, AZ 85745 |

| Mfr. Code | Name and Address |
|---|---|
| 70903 | Belden Corporation<br>2000 S. Batavia Avenue<br>Geneva, IL 60134 |
| 71279 | Cambridge Thermionic Corp.<br>445 Concord Avenue<br>Cambridge, MA 02138 |
| 73138 | Beckman Instruments, Inc.<br>2500 Harbor Blvd.<br>Fullerton, CA 92634 |
| 75037 | Electro Products Division<br>3M Center<br>St. Paul, MN 55101 |
| 76055 | Mallory Controls Division<br>P. O. Box 327<br>State Road 2820<br>Frankfort, IN 46041 |
| 80131 | Electronic Industries Ass.<br>2001 Eye Street, N.W.<br>Washington, DC 20006 |
| 81312 | Winchester Electronics<br>Mainstreet & Hillside Avenue<br>Oakville, CT 06779 |
| 91293 | Johanson Manufacturing Co.<br>P.O. Box 329<br>Boonton, NJ 07005 |
| 91506 | Augat, Inc.<br>33 Perry Avenue<br>P.O. Box 779<br>Attleboro, MA 02703 |
| 94902 | Coilcraft, Inc.<br>222 Avenue East<br>Hawarden, IA 51023 |
| 96341 | Microwave Associates, Inc.<br>South Avenue<br>Burlington, MA 01803 |
| 98291 | Sealectro Corporation<br>225 Hoyt<br>Marmaroneck, NY 10544 |
| 99800 | American Precision Ind., Inc.<br>270 Quaker Road<br>East Aurora, NY 14052 |

B.8.4 **PROVISIONING NOTE - INCONSISTENCIES IN PART NUMBERING CONVENTIONS**

The internal computer applications at BAE SYSTEMS Gaithersburg Operations have undergone upgrades to better serve our customers. With this upgrade came alterations to the numbering scheme for parts reporting to an end item. Due to these alterations, minor inconsistencies may exist between identifying parts numbers found on drawings, piece parts, or other documentation. No form fit and function specifications have been altered due to this change in the numbering scheme.

The inconsistencies take two forms. New part number conventions mandate the use of three-digit suffixes for part numbers used within computer applications. Part numbers having single-digit suffixes have been altered by the addition of leading zeroes. Therefore, a piece part with an identifying number having a suffix of "-2" may be represented in a computer-generated document with a part number having a suffix of "-002". Also the new part numbering convention requires that the base portion of a part number be made up of six digits. Part numbers with base portions with less than six digits are expressed with leading zeroes to meet this requirement. Accordingly, a part number having a base of "34456" may appear as "034456". If you have questions or concerns regarding the configuration identification of piece parts, contact the plant for additional information at 1-800-954-3577.

## D.8.5 PARTS LIST

The parts list which follows contains all electrical parts used in the equipment and certain mechanical parts which are subject to unusual wear or damage. When ordering replacement parts from BAE SYSTEMS, specify the type and serial number of the equipment and the reference designation and description of each part ordered. The list of maufacturers provided in **paragraph D.8.3** and the manufacturer's part number for components are included as a guide to the user of the equipment in the field. These parts may not necessarily agree with the parts installed in the equipment; however, the parts specified in this list will provide satisfactory operation of the equipment. Replacement parts may be obtained from any manufacturer as long as the physical and electrical parameters of the part selected agree with the original indicated part. In the case of components defined by a military or industrial specification, a vendor which can provide the necessary component is suggested as a convenience to the user.

**NOTE**

As improved semiconductors become available, it is the policy of BAE SYSTEMS to incorporate them in proprietary products. For this reason some transistors, diodes and integrated circuits installed in the equipment may not agree with those specified in the parts lists and schematic diagrams of this manual. However, the semiconductors designated in the manual may be substituted in every case with satisfactory results.

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| D.8.6 | **WJ-8615/FEX-16 FREQUENCY EXTENDER OPTION** | | | | **MAIN CHASSIS** |
| | Revision A | | | | |
| A3 | Frequency Extender | 1 | 796781-1 | 14632 | |
| J10 | Connector, Jack: N-Type, Part of W7 | 1 | 3004-7388-10 | 16179 | |
| P10 | Connector, Plug, Part of W6 | 2 | 50-328-3875-91 | 98291 | |
| P11 | Connector, Plug, Part of W6 | 1 | 2150-7521-008 | 19505 | |
| P12 | Same as P10, Part of W7 | | | | |
| W6 | Cable Assembly | 1 | 380535-6 | 14632 | |
| W7 | Cable Assembly | 1 | 281990-1 | 14632 | |

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| D.8.6.1 | **Type 796781-1 Frequency Extender Assembly** | | | REF DESIG PREFIX **A3** | |
| | Revision A | | | | |
| A1 | Motherboard Assembly | 1 | 381888-1 | 14632 | |
| A2 | RF Switch Assembly | 1 | 381812-1 | 14632 | |
| C1 | Capacitor, Ceramic, Feedthru: .05 µF, 300 V | 9 | 54-785-005-503P | 33095 | |
| C2 Thru C9 | Same as C1 | | | | |
| FB1 | Ferrite Bead | 20 | 56-590-65-4A | 02114 | |
| FB2 Thru FB20 | Same as FB1 | | | | |
| J1 | P/O A2 | | | | |
| J2 | Not Used | | | | |
| J3 | Not Used | | | | |
| J4 | Connector, Plug, Part of W2 | 2 | 50-330-0039-91 | 98291 | |
| J5 | Same as J4, Part of W4 | | | | |
| P1 | Connector, Plug | 2 | 1-87499-1 | 00779 | |
| P2 | Same as P1, Part of W2 | | | | |
| P3 | Not Used | | | | |
| P4 | Connector, Plug, Part of W2 | 3 | 50-328-3875-91 | 98291 | |
| P5 | Same as P4, Part of W3 | | | | |
| P6 | Not Used | | | | |
| P7 | Connector, Plug, Part of W3 | 2 | 50-024-3875-91 | 98291 | |
| P8 | Same as P7, Part of W4 | | | | |
| P9 | Same as P4, Part of W5 | | | | |
| W1 | Not Used | | | | |
| W2 | Cable Assembly | 1 | 38035-2 | 14632 | |
| W3 | Cable Assembly | 1 | 38035-3 | 14632 | |
| W4 | Cable Assembly | 1 | 38035-4 | 14632 | |
| W5 | Cable Assembly | 1 | 38035-5 | 14632 | |

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|

### D.8.6.1.1 Type 381888-1 Motherboard

REF DESIG PREFI **A3A1**

| | | | | |
|---|---|---|---|---|
| | Revision A | | | |
| A1 | UHF Preselector | 1 | 796769-1 | 14632 |
| A2 | UHF Preamplifier, Mixer | 1 | 796768-1 | 14632 |
| A3 | UHF LO Synthesizer | 1 | 798079-2 | 14632 |
| C1 | Capacitor, Ceramic, Disc: .1 µF, 20%, 50 V | 3 | 34475-1 | 14632 |
| C2 | Same as C1 | | | |
| C3 | Same as C1 | | | |
| C4 | Capacitor, Ceramic, Disc: .47 µF, 20%, 50 V | 1 | 34452-1 | 14632 |
| C5 | Capacitor, Electrolytic, Tantalum: 100 µF, 20%, 35 V | 2 | MTP107M035P1C | 76055 |
| C6 | Same as C5 | | | |
| C7 | Capacitor, Ceramic, Disc: .01 µF, 20%, 50 V | 6 | 34453-1 | 14632 |
| C8 Thru C12 | Same as C7 | | | |
| CR1 | Diode | 2 | 1N4446 | 80131 |
| CR2 | Same as CR1 | | | |
| E1 | Terminal, Forked | 9 | 140-1941-03-01 | 71279 |
| E2 Thru E9 | Same as E1 | | | |
| J1 | Connector, Receptacle | 1 | 514-AG10D | 91506 |
| L1 | Coil, Fixed: .47 µH | 1 | 1025-12 | 99800 |
| P1 | Connector, Plug, Part of W1 | 1 | 3406-0002 | 75037 |
| R1 | Resistor, Fixed, Film: 1.0 kΩ, 5%, 1/8 W | 1 | CF1/8-1.0K/J | 09021 |
| R2 | Resistor, Fixed, Film: 2.7 kΩ, 5%, 1/8 W | 1 | CF1/8-2.7K/J | 09021 |
| R3 | Resistor, Fixed, Film: 10Ω, 5%, 1/8W | 1 | CF1/8-10 OHMS/J | 09021 |
| R4 | Resistor, Fixed, Fiflm: 2.7Ω, 5%, 1/4 W | 1 | CF1/4-2.7 OHMS/J | 09021 |
| U1 | Integrated Circuit | 1 | LM358N | 27014 |
| W1 | Cable Assembly | 1 | 380532-1 | 14632 |
| XA1 | Connector | 2 | MK30X-13-195-4381 | 81312 |
| XA2 | Same as XA1 | | | |
| XA3 | Connector, Receptacle, Part of W1 | 1 | RF30-2852-5 | 57856 |

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| D.8.6.1.1.1 ***Type 796769-1 UHF Preselector*** | | | REF DESIG PREFIX **A3A1A1** | | |
| | Revision A1 | | | | |
| C1 | Chip, Capacitor: 220 pF, ±5%, 50 V | 10 | 841250-09 | 14632 | |
| C2 Thru C6 | Same as C1 | | | | |
| C7 | Not Used | | | | |
| C8 | Capacitor, Ceramic, Chip: 47 pF, 5%, 500 V | 3 | ATC100B470JP500X | 29990 | |
| C9 | Chip, Capacitor: .10 µF, ±20%, 50 V | 5 | 841250-24 | 14632 | |
| C10 | Chip, Capacitor: 1000 pF, ±5%, 50 V | 5 | 841250-13 | 14632 | |
| C11 | Same as C9 | | | | |
| C12 | Same as C10 | | | | |
| C13 | Same as C9 | | | | |
| C14 | Same as C10 | | | | |
| C15 | Same as C8 | | | | |
| C16 Thru C19 | Same as C1 | | | | |
| C20 | Same as C9 | | | | |
| C21 | Same as C9 | | | | |
| C22 | Same as C10 | | | | |
| C23 | Same as C10 | | | | |
| C24 | Same as C8 | | | | |
| C25 | Chip. Capacitor: 100 pF, ±5%, 50 Vdc | 13 | 841250-07 | 14632 | |
| C26 Thru C37 | | | | | |
| CR1 | PIN Diode | 12 | 841320 | 14632 | |
| CR2 | Same as CR1 | | | | |
| CR3 | Same as CR1 | | | | |
| CR4 | Diode | 8 | UM9601 | 12969 | |
| CR5 | Same as CR4 | | | | |
| CR6 | Same as CR1 | | | | |
| CR7 | Same as CR1 | | | | |
| CR8 | Same as CR4 | | | | |
| CR9 | Same as CR4 | | | | |
| CR10 Thru CR14 | Same as CR1 | | | | |
| CR15 Thru CR18 | Same as CR1 | | | | |
| CR19 | Same as CR1 | | | | |
| CR20 | Same as CR1 | | | | |
| E1 | Connector, Termial, Part of W1 | 3 | 55-039-3875-91 | 98291 | |
| E2 | Same as E1, Part of W2 | | | | |

REF DESIG PREFIX **A3A1A1**

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| E3 | Same as E1, Part of W3 | 13 | 140-1941-02-01 | 71279 | |
| E4 | Terminal, Forked | 13 | 140-1941-02-01 | 71279 | |
| E5 Thru E16 | Same as E4 | | | | |
| FB1 | Ferrite, Chip: 120Ω, ±25%, 100 MHz | 5 | CB30-453215B | 54583 | |
| FB2 Thru FB5 | Same as FB1 | | | | |
| FB6 | Ferrite, Chip: 31Ω, ±25%, 100 MHz | 10 | CB70-322513B | 54583 | |
| FB7 Thru FB15 | Same as FB6 | | | | |
| FL1 | Filter, Bandpass: 600 MHz = CF, 210 MHz = BW | 1 | 92506 | 14632 | |
| FL2 | Filter, Bandpass: 800 MHz = CF, 210 MHz = BW | 1 | 92507 | 14632 | |
| FL3 | Filter, Bandpass: 1025 MHz = CF, 260 MHz = BW | 1 | 92508 | 14632 | |
| FL4 | Filter, Bandpass: 1250 MHz = CF, 210 MHz = BW | 1 | 92509 | 14632 | |
| FL5 | Filter, Bandpass: 1475 MHz = CF, 260 MHz = BW | 1 | 92510 | 14632 | |
| JW1 | Wire, Electrical, Busswire | AR | 8021 22AWG | 70903 | |
| JW2 Thru JW8 | Same as JW1 | | | | |
| L1 | Inductor, Chip: 0.1 µH, ±20% | 11 | B82422-A3101-M | 25088 | |
| L2 | Same as L1 | | | | |
| L3 | Same as L1 | | | | |
| L4 | Inductor, Chip: 0.47 µH, ±20% | 2 | B82422-A3471-M | 25088 | |
| L5 | Same as L4 | | | | |
| L6 Thru L13 | Same as L1 | | | | |
| P1 | Connector, Plug, Part of W1 | 3 | 50-328-3875-91 | 98291 | |
| P2 | Same as P1, Part of W2 | | | | |
| P3 | Same as P1, Part of W3 | | | | |
| R1 | Resistor, Fixed, Chip: 470Ω, 5%, 1/8 W | 10 | 841296-57 | 14632 | |
| R2 Thru R4 | Same as R1 | | | | |
| R5 | Resistor, Fixed, Chip: 1.2 kΩ, 5%, 1/8 W | 3 | 841296-67 | 14632 | |
| R6 | Same as R1 | | | | |
| R7 | Same as R1 | | | | |
| R8 | Same as R5 | | | | |
| R9 Thru R12 | Same as R1 | | | | |
| R13 | Same as R5 | | | | |

REF DESIG PREFIX **A3A1A1**

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| W1 | Cable Assembly | 1 | 17300-439-1 | 14632 | |
| W2 | Cable Assembly | 1 | 17300-439-2 | 14632 | |
| W3 | Cable Assembly | 1 | 17300-439-3 | 14632 | |

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| D.8.6.1.1.2 | ***Type 798079-2 UHF LO Synthesizer Preamplifier/Mixer*** | | | REF DESIG PREFIX **A3A1A2** | |
| | Revision E | | | | |
| C1 | Chip, Capacitor: .01 µF, ±10%, 50 Vdc | 6 | 841250-19 | 14632 | |
| C2 | Same as C1 | | | | |
| C3 | Chip, Capacitor: 1000 pF, ±5%, 50 V | 14 | 841250-13 | 14632 | |
| C4 | Same as C1 | | | | |
| C5 | Same as C3 | | | | |
| C6 | Same as C3 | | | | |
| C7 | Same as C1 | | | | |
| C8 | Same as C1 | | | | |
| C9 | Same as C3 | | | | |
| C10 | Same as C3 | | | | |
| C11 | Chip, Capacitor: .047 µF, ±10%, 50 Vdc | 2 | 841250-23 | 14632 | |
| C12 | Chip, Capacitor: 220 pF, ±5%, 50 V | 1 | 841250-09 | 14632 | |
| C13 | Capacitor, Ceramic, Chip: 4.3 pF, ±0.5 pF, 500 V | 2 | ATC700B4R3DP500X | 29990 | |
| C14 | Same as C13 | | | | |
| C15 | Same as C3 | | | | |
| C16 | Same as C3 | | | | |
| C17 | Chip, Capacitor: .10 µF, ±20%, 50 V | 12 | 841250-25 | 14632 | |
| C18 Thru C20 | Same as C17 | | | | |
| C21 Thru C23 | Same as C3 | | | | |
| C24 Thru C29 | Same as C17 | | | | |
| C30 | Capacitor, Electrolytic, Chip: 10 µF, 20%, 16 V | 1 | 841293-16 | 14632 | |
| C31 | Same as C17 | | | | |
| C32 | Capacitor, Electrolytic, Chip: 4.7 µF, 20%, 25 V | 2 | 841293-13 | 14632 | |
| C33 | Same as C17 | | | | |
| C34 | Same as C32 | | | | |
| C35 | Same as C11 | | | | |
| C36 | Capacitor, Ceramic, Chip: 47 pF, 5%, 500 V | 2 | ATC100B470JP500X | 29990 | |
| C37 | Same as C36 | | | | |
| C38 | Same as C1 | | | | |
| C39 | Same as C3 | | | | |
| C40 | Chip, Capacitor: 100 pF, ±5%, 50 Vdc | 3 | 841250-07 | 14632 | |
| C41 | Same as C40 | | | | |
| C42 | Same as C3 | | | | |
| C43 | Same as C3 | | | | |
| C44 | Same as C40 | | | | |
| C45 | Same as C3 | | | | |
| CR1 | Diode | 4 | UM9601 | 12969 | |

REF DESIG PREFIX **A3A1A2**

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| CR2 | Same as CR1 | | | | |
| CR3 | PIN Diode | | | | |
| CR4 | Same as CR3 | | | | |
| CR5 | Same as CR1 | | | | |
| CR6 | Same as CR3 | | | | |
| CR7 | Same as CR3 | | | | |
| CR8 | Same as CR1 | | | | |
| CR9 | Same as CR3 | | | | |
| FB1 | Ferrite, Chip: 520Ω, ±25%, 100 MHz | 3 | CB30-322513T | 54583 | |
| FB2 | Same as FB1 | | | | |
| FB3 | Same as FB1 | | | | |
| FB4 | Ferrite, Chip: 32Ω, ±25%, 100 MHz | 6 | CB70-322513B | 54583 | |
| FB5 Thru FB9 | Same as FB4 | | | | |
| FL1 | Filter, Low Pass: 495-1155 MHz | 1 | 92519 | 14632 | |
| FL2 | Filter, Highpass: 1145-1810 MHz | 1 | 92520 | 14632 | |
| J1 | Connector, Receptacle | 5 | 1009-7511-000 | 19505 | |
| J2 Thru J5 | Same as J1 | | | | |
| JW1 | Wire, Teflon | 7 | 26-SOLID WHT | 12515 | |
| JW2 Thru JW7 | Same as JW1 | | | | |
| L1 | Inductor, Chip: 0.47 µH, ±20% | 2 | B82422-A3471-M | 25088 | |
| L2 | Inductor, Chip: 0.1 µH, ±20% | 2 | B82422-A3101-M | 25088 | |
| L3 | Same as L2 | | | | |
| L4 | Inductor: 47 µH, 10% | 1 | 841444-041 | 14632 | |
| L5 | Same as L1 | | | | |
| L6 | Inductor, Chip: 15 nH, ±5% | 1 | 841438-005 | 14632 | |
| L7 | Inductor, Chip: 4.7 µH, ±20% | 1 | B82422-A1472-M | 25088 | |
| Q1 | Transistor | 2 | MMBT-4403 | 04713 | |
| Q2 | Transistor | 2 | MMBT2222A | 04713 | |
| Q3 | Same as Q1 | | | | |
| Q4 | Same as Q2 | | | | |
| R1 | Resistor, Fixed, Chip: 470Ω, 5%, 1/8 W | 4 | 841296-57 | 14632 | |
| R2 | Resistor, Fixed, Chip: 1.2 kΩ, 5%, 1/8 W | 2 | 841296-67 | 14632 | |
| R3 | Same as R1 | | | | |
| R4 | Resistor, Fixed, Chip: 2.7 kΩ, 5%, 1/8 W | 1 | 841296-75 | 14632 | |
| R5 | Resistor, Fixed, Chip: 2.2 kΩ, 5%, 1/8 W | 1 | 841296-73 | 14632 | |
| R6 | Resistor, Fixed, Chip: 2.4 kΩ, 5%, 1/8 W | 1 | 841296-74 | 14632 | |

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| D.8.6.1.1.3.1 **Part 390421-1 UHF Variable Divider** | | | REF DESIG PREFIX **A3A1A3A1** | | |
| | Revision R1 | | | | |
| C1 | Capacitor, Ceramic, Disc: 470 pF, ±20%, 1000 V | 7 | 8381KVZ5U470 | 59660 | |
| C2 | Same as C1 | | | | |
| C3 | Same as C1 | | | | |
| C4 | Capacitor, Ceramic, Disc: .01 µF, 20%, 50 V | 6 | 34453-1 | 14632 | |
| C5 Thru C7 | Same as C4 | | | | |
| C8 | Capacitor, Electrolytic, Tantalum: 4.7 µF, 20%, 35 V | 5 | 196D475X0035JE3 | 56289 | |
| C9 | Same as C8 | | | | |
| C10 | Capacitor, Ceramic, Disc: .1 µF, 20%, 50 V | 1 | 34475-1 | 14632 | |
| C11 | Capacitor, Ceramic, Chip: 470 pF, 10%, 100 V | 9 | C1210C471K1GAC | 31433 | |
| C12 Thru C18 | Same as C11 | | | | |
| C19 | Capacitor, Ceramic, Disc: .47 µF, 20%, 50 V | 2 | 34452-1 | 14632 | |
| C20 | Same as C8 | | | | |
| C21 | Same as C19 | | | | |
| C22 | Same as C4 | | | | |
| C23 | Same as C1 | | | | |
| C24 | Capacitor, Electrolytic, Tantalum: 22 µF, 20%, 10 V | 1 | 196D226X0010JE3 | 56289 | |
| C25 | Same as C1 | | | | |
| C26 | Same as C8 | | | | |
| C27 | Same as C8 | | | | |
| C28 | Same as C1 | | | | |
| C29 | Same as C1 | | | | |
| C30 | Same as C4 | | | | |
| C31 | Same as C11 | | | | |
| CR1 | Diode, PIN | 1 | GC4211-15 | 50101 | |
| E1 | Terminal, Forked | 17 | 140-1941-02-01 | 71279 | |
| E2 Thru E7 | Same as E1 | | | | |
| E8 | Not Used | | | | |
| E9 Thru E11 | Same as E1 | | | | |
| E12 | Not Used | | | | |
| E13 | Same as E1 | | | | |
| E14 | Same as E1 | | | | |
| E15 | Not Used | | | | |
| E16 Thru E20 | Same as E1 | | | | |
| L1 | Inductor | 1 | 22292-170 | 14632 | |

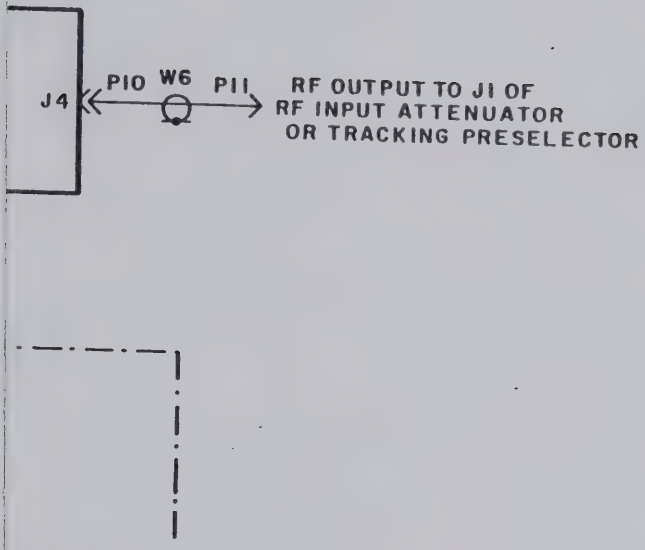
REF DESIG PREFIX **A3A1A3A1**

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| Q1 | Transistor | 2 | 2N3904 | 80131 | |
| Q2 | Same as Q1 | | | | |
| R1 | Resistor, Fixed, Film: 10 kΩ, 5%, 1/4 W | 7 | CF1/4-10K/J | 09021 | |
| R2 Thru R6 | Same as R1 | | | | |
| R7 | Resistor, Fixed, Film: 27Ω, 5%, 1/4 W | 1 | CF1/4-27 OHMS/J | 09021 | |
| R8 | Resistor, Fixed, Film: 100Ω, 5%, 1/4 W | 2 | CF1/4-100 OHMS/J | 09021 | |
| R9 | Resistor, Fixed, Film: 68Ω, 5%, 1/8 W | 1 | CF1/8-68 OHMS/J | 09021 | |
| R10 | Resistor, Fixed, Film: 47Ω, 5%, 1/8 W | 1 | CF1/8-47 OHMS/J | 09021 | |
| R11 | Resistor, Fixed, Film: 100Ω, 5%, 1/8 W | 1 | CF1/8-100 OHMS/J | 09021 | |
| R12 | Resistor, Fixed, Film: 1.0 kΩ, 5%, 1/4 W | 1 | CF1/4-1 K/J | 09021 | |
| R13 | Resistor, Fixed, Film: 15 kΩ, 5%, 1/4 W | 1 | CF1/4-15K//J | 09021 | |
| R14 | Resistor, Fixed, Film: 3.6 kΩ, 5%, 1/4 W | 1 | CF1/4-3.6K/J | 09021 | |
| R15 | Resistor, Fixed, Film: 1.5 kΩ, 5%, 1/4 W | 1 | CF1/4-1.5K/J | 09021 | |
| R16 | Not Used | | | | |
| R17 | Resistor, Fixed, Film: 330Ω, 5%, 1/4 W | 1 | CF1/4-330 OHMS/J | 09021 | |
| R18 | Same as R12 | | | | |
| R19 | Resistor, Trimmer, Film: 2 kΩ, 10%, 1/2 W | 1 | 62PAR2K | 73138 | |
| R20 | Resistor, Fixed, Film: 3.3 kΩ, 10%, 1/4 W | 1 | CF1/4-3.3K/J | 09021 | |
| R21 | Same as R1 | | | | |
| R22 | Resistor,Fixed, Film: 4.7 kΩ, 5%, 1/4 W | 1 | CF1/4-4.7K/J | 09021 | |
| R23 | Same as R8 | | | | |
| R24 | Resistor, Fixed, Film: 4.7 MΩ, 5%, 1/4 W | 1 | CF1/4-4.7M/J | 09021 | |
| R25 | Resistor, Fixed, Film: 180Ω, 5%, 1/8 W | 1 | CF1/8-180 OHMS/J | 09021 | |
| RA1 | Heatsink, Integrated Circuit | 1 | 290509-1 | 14632 | |
| U1 | Integrated Circuit | 1 | SP8695B/DG | 52648 | |
| U2 | Integrated Circuit | 1 | SP8602B/CM | 52648 | |
| U3 | Integrated Circuit | 1 | SP8611B/DG | 52648 | |
| U4 | Amplifier | 1 | GPD-410 | 24539 | |
| U5 | Integrated Circuit | 1 | HA1-4741-5 | 34371 | |
| U6 | Integrated Circuit | 2 | SN74LS161AN | 01295 | |
| U7 | Same as U6 | | | | |
| U8 | Integrated Circuit | 1 | SN74S138N | 01295 | |
| U9 | Integrated Circuit | 1 | SN74LS04N | 01295 | |
| U10 | Integrated Circuit | 1 | MC4044P | 04713 | |

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| | **D.8.6.1.1.3.2 Type 796719-1 UHF Oscillator Assembly** | | | REF DESIG PREFIX **A3A1A3A2** | |
| | Revision A | | | | |
| A1 | UHF Oscillator PC Assembly | 1 | 381473-1 | 14632 | |
| C1 | Capacitor, Feedthru, EMI: 1000 pF, 100 V | 6 | 54-790-018 | 33095 | |
| C2 Thru C6 | Same as C1 | | | | |
| E1 | Terminal, Feedthru, Insulated | 1 | 001-1007 | 98291 | |
| J1 | Connector, Receptacle | 1 | 1012-1511-000 | 19505 | |
| R1 | Resistor, Fixed, Film: 22 kΩ, 5%, 1/8 W | 4 | CF1/8-11K/J | 09021 | |
| R2 Thru R4 | Same as R1 | | | | |

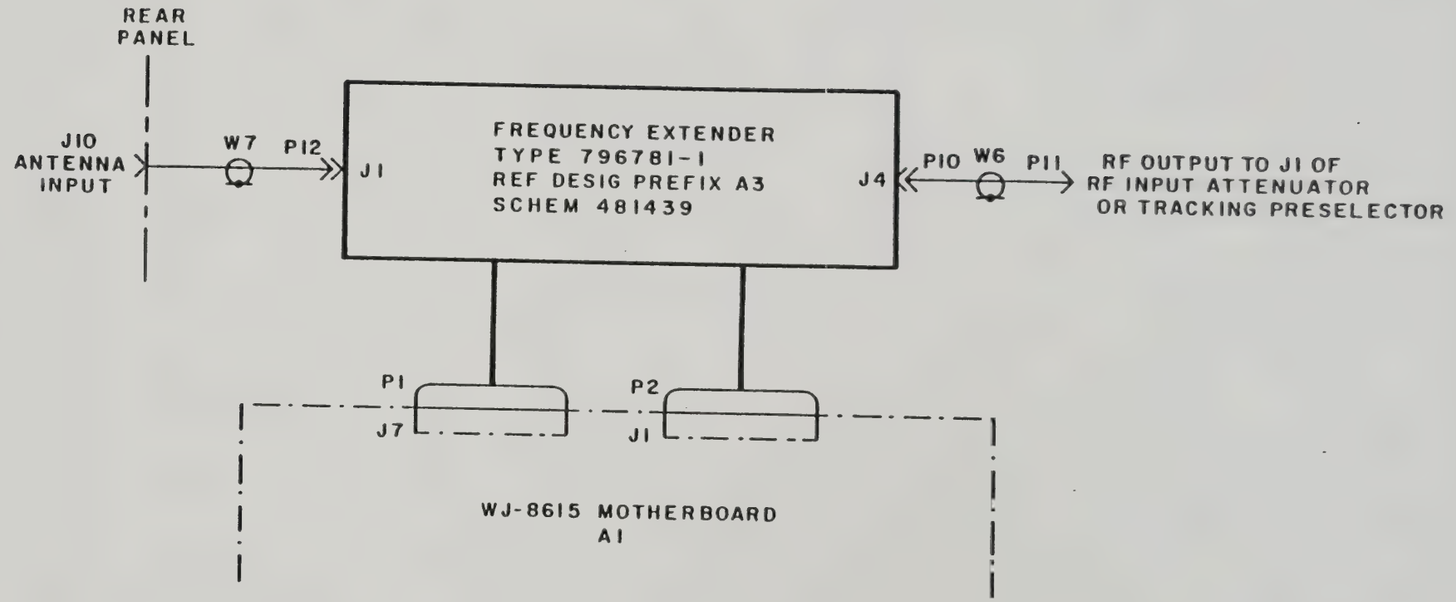
| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| D.8.6.1.1.3.2.1 | **Part 381473-1 UHF Oscillator** | | REF DESIG PREFIX **A3A1A3A2A1** | | |
| | Revision A | | | | |
| C1 | CAP PAD IPF P/O PC Artwork | | | | |
| C2 | Capacitor, Ceramic, Chip: 1.5 nF, ±.1 pF, 500 V | 3 | ATC175B1R5BP500X | 29990 | |
| C3 | Capacitor, Variable, Air: .4-2.5 pF, 500 V | 4 | 27283 | 91293 | |
| C4 | Capacitor, Ceramic, Chip: 5.6 pF, ±.1 pF, 500 V | 2 | ATC175B165BP500X | 29990 | |
| C5 | Same as C1 | | | | |
| C6 | Same as C2 | | | | |
| C7 | Same as C3 | | | | |
| C8 | Same as C4 | | | | |
| C9 | Same as C1 | | | | |
| C10 | Same as C2 | | | | |
| C11 | Same as C3 | | | | |
| C12 | Capacitor, Ceramic, Chip: 4.7 pF, ±.1 pF, 500 V | 1 | ATC175B4R7BP500X | 29990 | |
| C13 | Same as C1 | | | | |
| C14 | Capacitor, Ceramic, Chip: 1.0 pF, ±.1 pF, 500 V | 1 | ATC175B4R0BP500X | 29990 | |
| C15 | Same as C3 | | | | |
| C16 | Capacitor, Ceramic, Chip: 3.9 pF, ±.1 pF, 500 V | 1 | ATC175B3R9BP500X | 29990 | |
| C17 | Capacitor, Electrolytic, Tantalum: 22 µF, 20%, 15 V | 1 | MMS-015-226R-20 | 14674 | |
| C18 | Capacitor, Ceramic, Monolithic: 1.5 pF, ±.1 pF, 100 V | 1 | 100-100-NPO-209B | 51642 | |
| C19 | Capacitor, Ceramic, Monolithic: 2.0 pF, ±.1 pF, 100 V | 2 | 100-100-NPO-249B | 51642 | |
| C20 | Capacitor, Ceramic, Monolithic: 2.0 pF, ±.1 pF, 100 V | 2 | 100-100-NPO-109B | 51642 | |
| C21 | Same as C20 | | | | |
| C22 | Same s C18 | | | | |
| C23 | Capacitor, Ceramic, Disc: .01 µF, 20%, 50 V | 1 | 34453-1 | 14632 | |
| CR1 | Tuning Varactor | 4 | MA-45240-31 | 96341 | |
| CR2 Thru CR4 | Same as CR1 | | | | |
| CR5 | Diode | 1 | 1N4449 | 80131 | |
| JW1 | Wire, Elec, Buss, AWG, Bus Wire | AR | 8021 22AWG | 70903 | |
| JW2 Thru JW4 | Same as JW1 | | | | |
| L1 | Coil, Fixed | 9 | 190187-1 | 14632 | |
| L2 Thru L9 | Same as L1 | | | | |
| L10 | Coil, Fixed | 3 | 180683-1 | 14632 | |
| L11 | Same as L10 | | | | |
| L12 | Same as L10 | | | | |
| Q1 | Transistor | 4 | MMBT2222A | 04713 | |
| Q2 | Transistor | 4 | 841269 | 14632 | |
| Q3 | Same as Q2 | | | | |
| Q4 | Same as Q1 | | | | |

**NOTES**



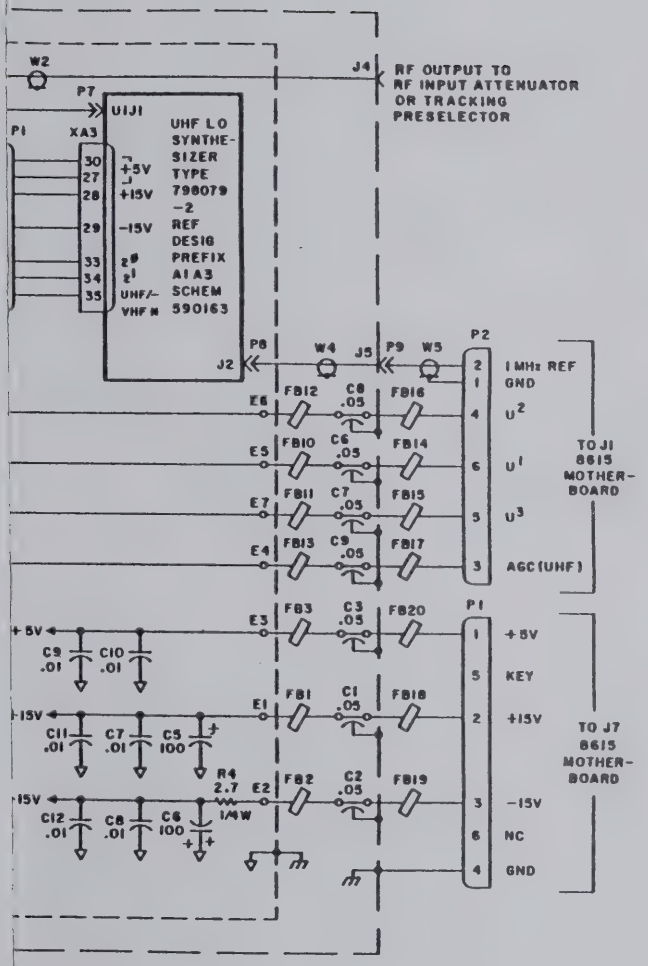

Type WJ-8615/FEX-16 Frequency Extender Option,
Main Chassis Schematic Diagram 381918

**NOTES**



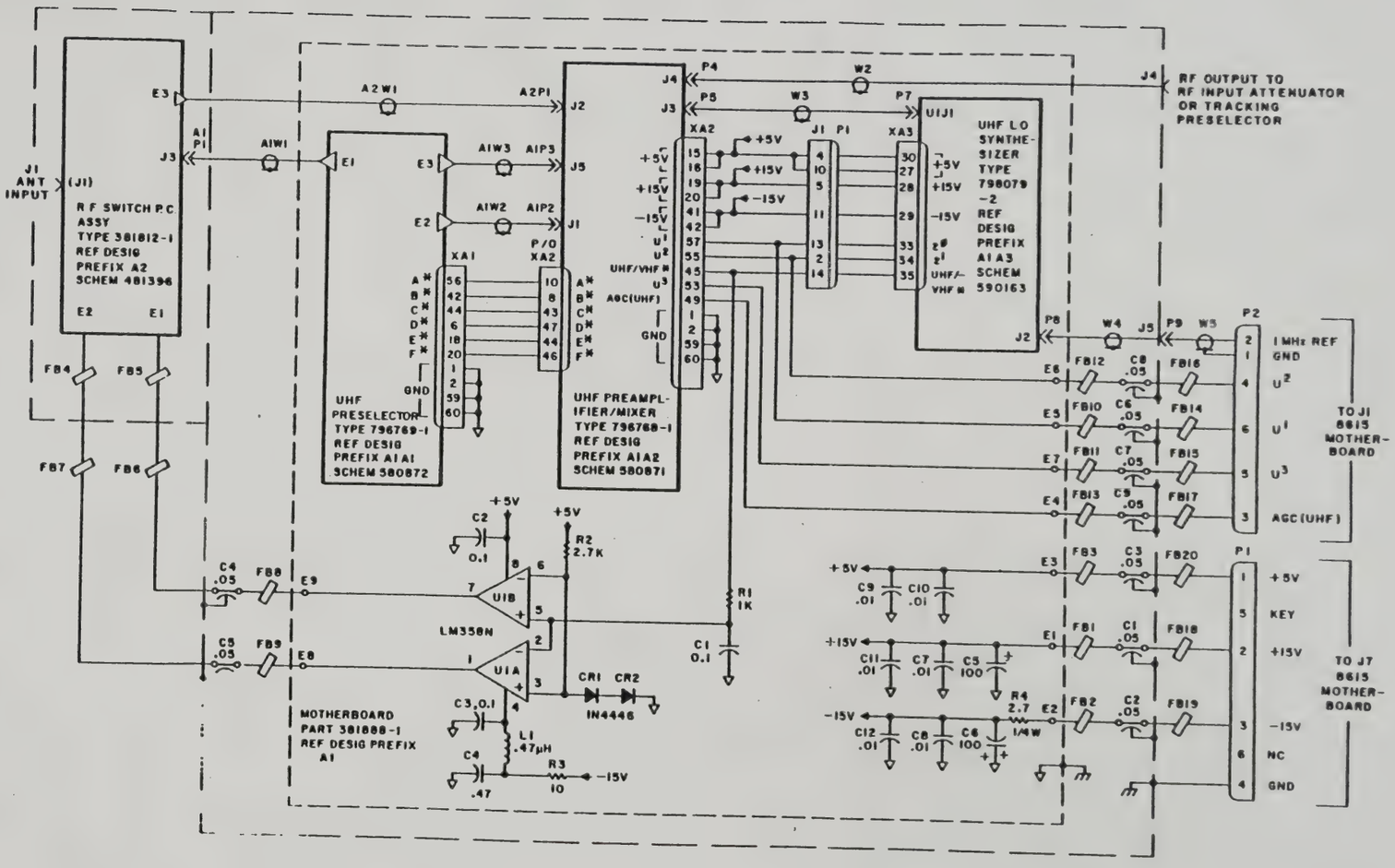

NOTES:
1. PHANTOM LINES INDICATE EXISTING PARTS OF UNIT.

FO-D-1. Type WJ-8615/FEX-16 Frequency Extender Option, Main Chassis Schematic Diagram 381918



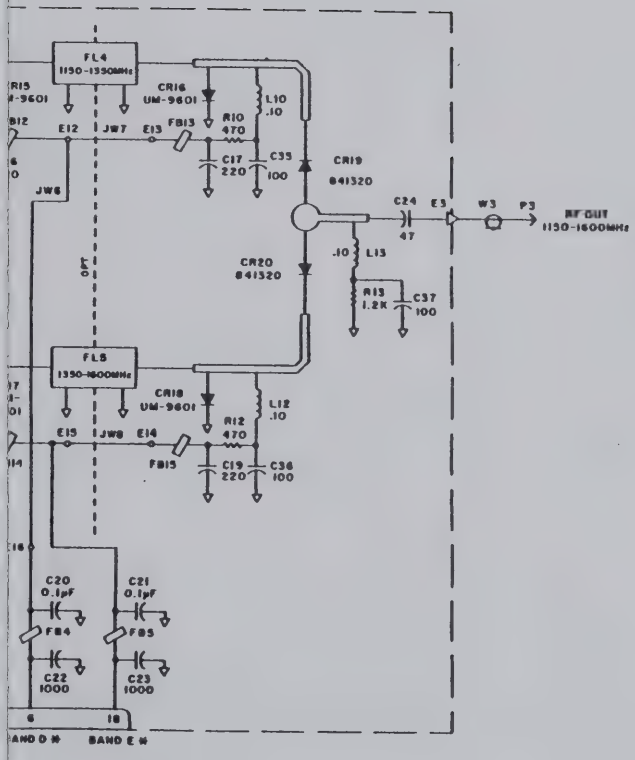

Type 796781-1 Frequency Extender Assembly (A3), Schematic Diagram 481439

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) CAPACITANCE IS IN μF.
   b) RESISTANCE IS IN OHMS, ±5%, 1/8W.



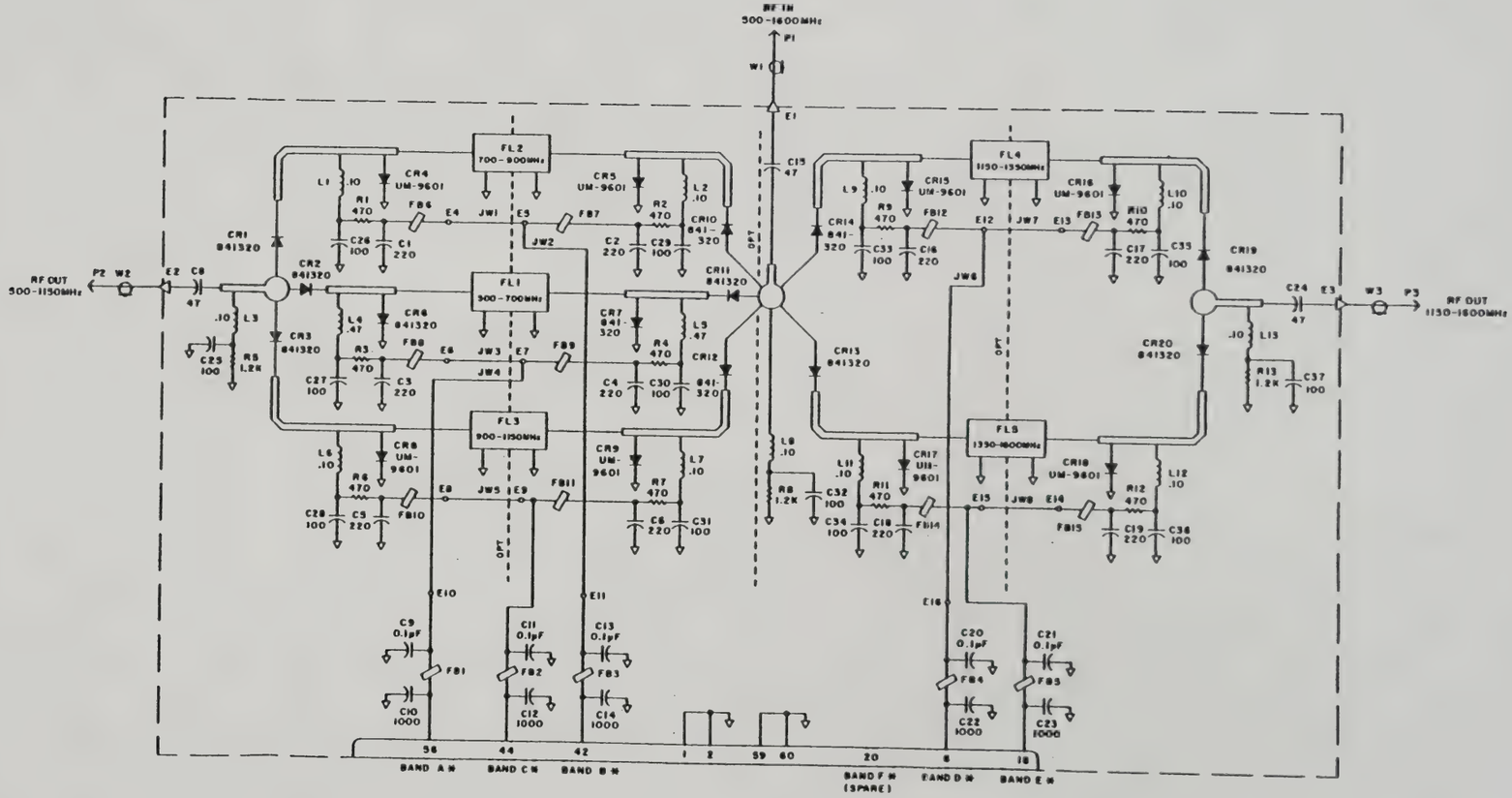

FO-D-2. Type 796781-1 Frequency Extender Assembly (A3), Schematic Diagram 481439

FP-D-3/(FP-D-4 blank)

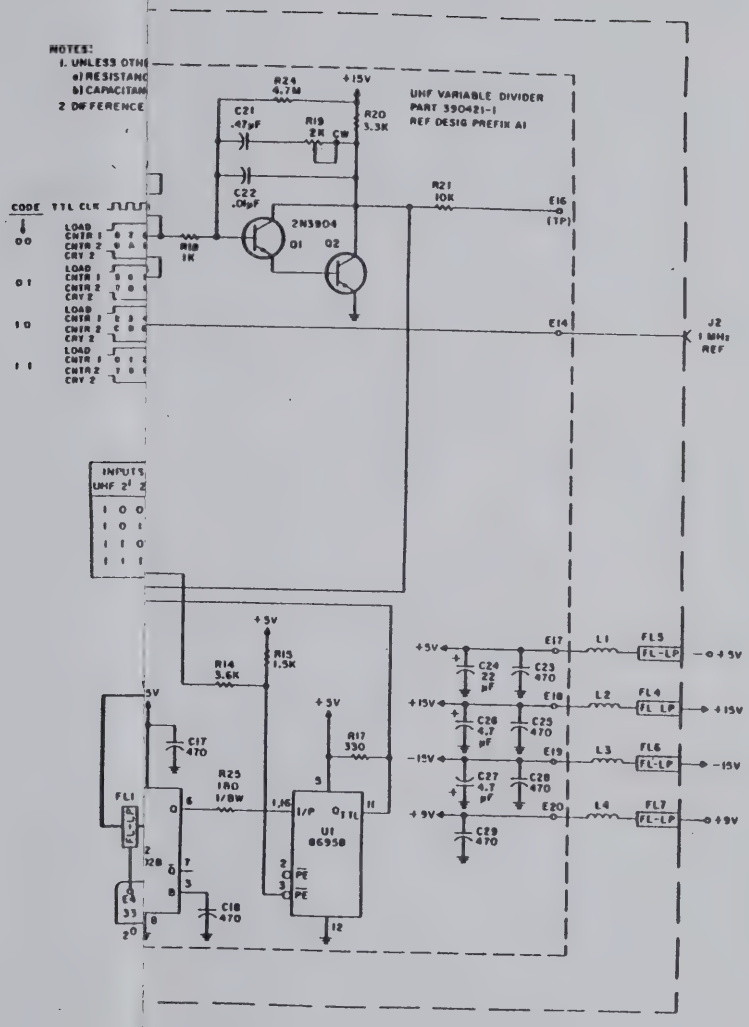



796769-1 UHF Preselector 500-1600 MHz (A3A1A1),
natic Diagram 580872

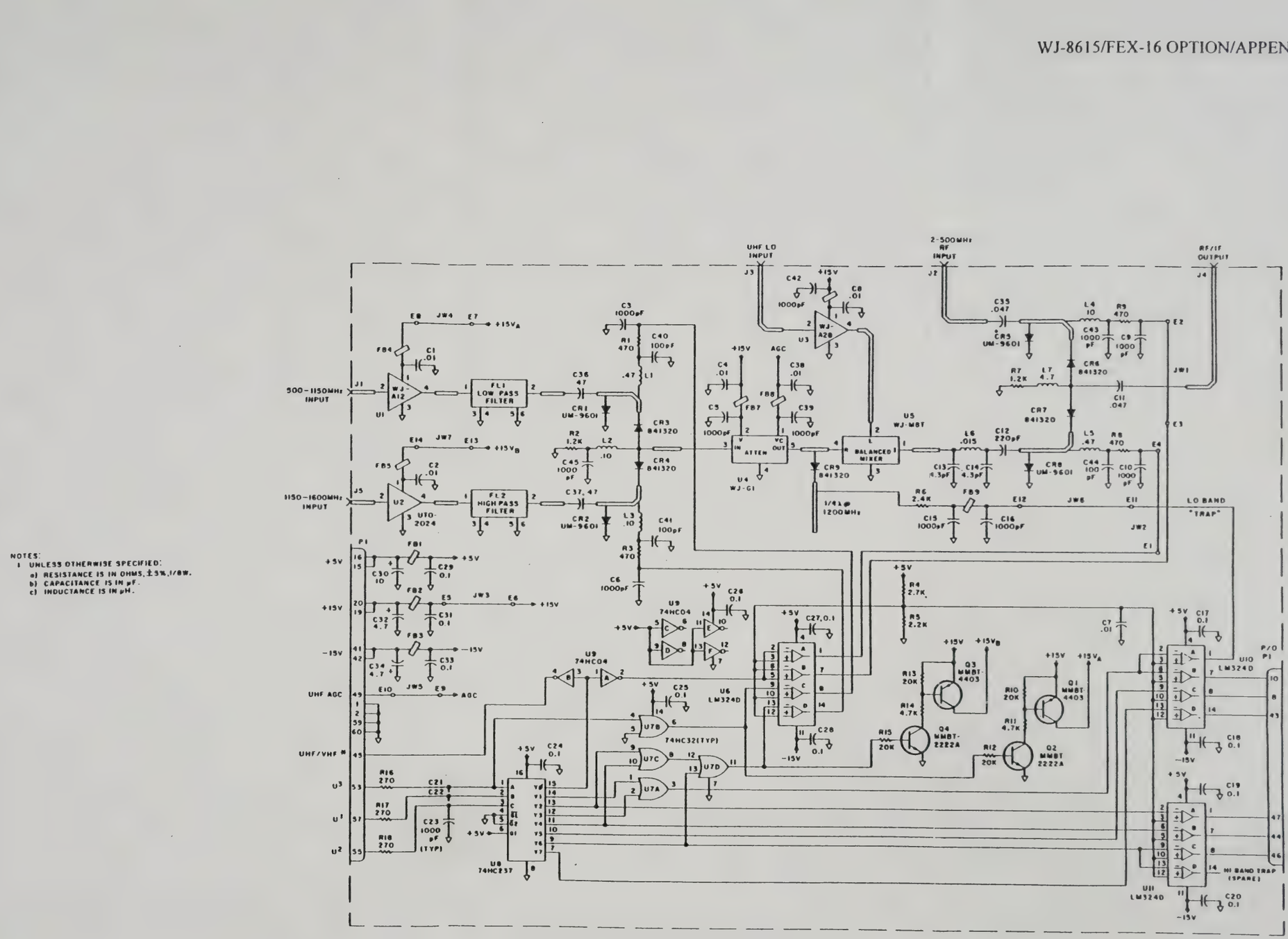
NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/8W.
   b) CAPACITANCE IS IN pF.




FO-D-3. Type 796769-1 UHF Preselector 500-1600 MHz (A3A1A1), Schematic Diagram 580872




Type 798097-2 UHF LO Synthesizer (A3A1A3),
Schematic Diagram 590163




FO-D-4. Type 796768-1 UHF Preamplifier/Mixer (A3A1A2), Schematic Diagram 580871

# WJ-8615 RECEIVER

## APPENDIX E

## WIDEBAND OUTPUT OPTION

BAE SYSTEMS
ADVANCED SYSTEMS
700 QUINCE ORCHARD ROAD
GAITHERSBURG, MARYLAND 20878

March 2001

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS IN pF.
2 DIFFERENCE BETWEEN TYPES IS MECHANICAL ONLY

TIMING DIAGRAM

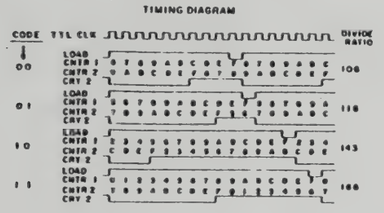
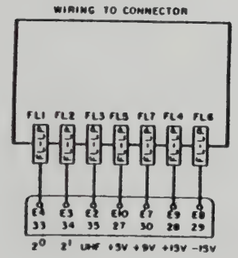
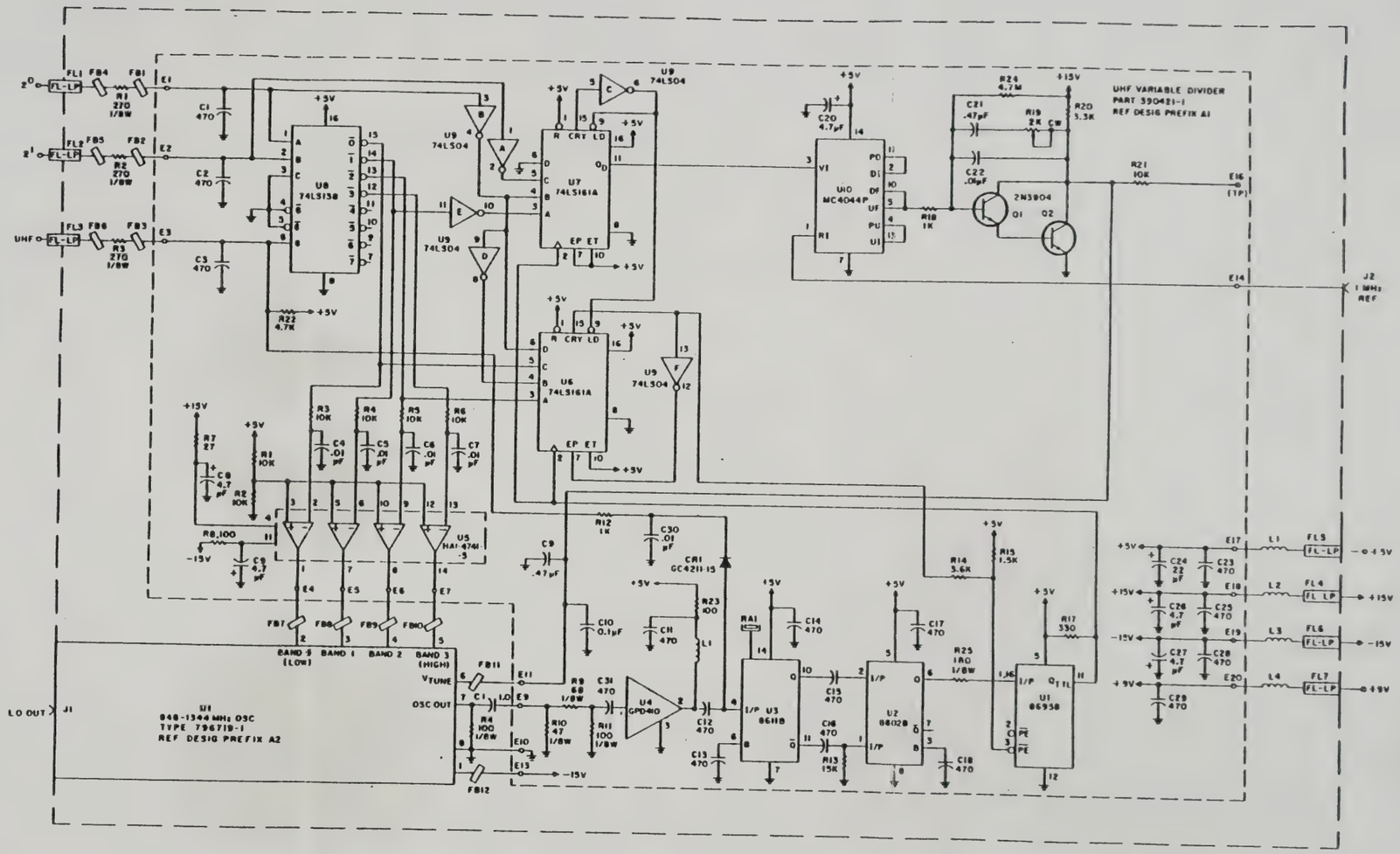



TABLE I

| INPUTS UHF $2^1$ $2^0$ | | CONTR 1 D C B A | CONTR 2 D C B A |
|---|---|---|---|
| 1 0 0 | → | 0 1 1 0 | 1 0 0 1 |
| 1 0 1 | → | 0 1 0 1 | 0 1 1 1 |
| 1 1 0 | → | 0 0 1 0 | 1 1 0 0 |
| 1 1 1 | → | 0 0 0 0 | 0 1 1 1 |

DETAIL A
WIRING TO CONNECTOR




FO-D-5. Type 798097-2 UHF LO Synthesizer (A3A1A3), Schematic Diagram 590163

# WJ-8615 RECEIVER

# APPENDIX E

# WIDEBAND OUTPUT OPTION

BAE SYSTEMS
ADVANCED SYSTEMS
700 QUINCE ORCHARD ROAD
GAITHERSBURG, MARYLAND 20878

March 2001

## PROPRIETARY STATEMENT

This document and subject matter disclosed herein are proprietary items to which BAE SYSTEMS retains the exclusive right of dissemination, reproduction, manufacture and sale.

This document is provided to the individual or using organization for their use alone in the direct support of the associated equipment unless permission for further disclosure is expressly granted in writing.

## WARRANTY

Seller warrants for a period of one year from the date of shipment, unless a different period has been agreed upon and incorporated into the Contract, that the products delivered or services rendered will conform to the specifications and be free from defects in workmanship and materials. THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF MERCHANTABILITY, FITNESS FOR PURPOSE, OR OTHER WARRANTIES OR GUARANTIES OF ANY KIND OR DESCRIPTION, WHETHER STATUTORY, EXPRESS, OR IMPLIED. If the goods delivered or services performed fail to conform to the warranty stated in this clause, Seller will correct the nonconformity at its expense by such repair, adjustment, modification, or replacement of the goods or services as Seller deems expedient. THE FOREGOING REMEDY OF BUYER FOR ANY FAILURE OF THE GOODS OR SERVICES TO MEET ANY WARRANTY IS EXCLUSIVE. BUYER EXPRESSLY AGREES THAT THE LIABILITY OF SELLER UNDER ANY WARRANTY SHALL NOT INCLUDE DAMAGE TO OUR LOSS OF PROPERTY OTHER THAN THE GOODS COVERED BY THE CONTRACT; LOSS OF PROFITS OR REVENUE; INCREASED COSTS OF ANY KIND; CLAIMS OF CUSTOMERS OF BUYER; OR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES. As to goods or components where the customer has funded the repair, Seller will warrant as limited above, the repaired portion of the unit for three months from the date of reshipment. EQUIPMENT OR PARTS DESCRIBED AS BEING MANUFACTURED BY OTHERS ARE SOLD BY SELLER AS IS and Buyer must look to the respective manufacturer for any and all claims with regard to said equipment or parts.

# TABLE OF CONTENTS

## APPENDIX E

## TYPE 796318-1 WIDEBAND OUTPUT OPTION (A2)


| Paragraph | | Page |
|---|---|---|
| E.1 | General Description | E-1 |
| E.2 | Electrical Description | E-1 |
| E.3 | Mechanical Description | E-1 |
| E.4 | Equipment Supplied | E-1 |
| E.5 | Equipment Required But Not Supplied | E-1 |
| E.6 | Connector Signals | E-1 |
| E.6.1 | J1 | E-1 |
| E.6.2 | J2 | E-1 |
| E.7 | Operation | E-2 |
| E.8 | Circuit Description | E-2 |
| E.9 | Type 796318-1 WBO (A2) Alignment Procedures | E-2 |
| E.10 | Type 796318-1 WBO (A2) Performance Test | E-3 |
| E.11 | Replacement Parts List | E-4 |
| E.11.1 | Unit Numbering Method | E-4 |
| E.11.2 | Reference Designation Prefix | E-4 |
| E.11.3 | List of Manufacturers | E-5 |
| E.11.4 | Provisioning Note - Inconsistencies In Part Numbering Conventions | E-5 |
| E.11.5 | Parts List | E-6 |
| E.12 | Type 796318-1 Wideband Output Assembly (A2) | E-7 |
| E.12.1 | Part 280515-1 Wideband Output 21.4 MHz Amplifier (A2A1) | E-8 |


## LIST OF ILLUSTRATIONS


| Figure | | Page |
|---|---|---|
| E-1 | WBO Option (A2) Alignment Test, Equipment Connections | E-2 |


## FOLDOUTS


| Foldout | | Page |
|---|---|---|
| FO-E-1 | Type 796318-1, Wideband Output 21.4 MHz Amplifier (A2), Schematic Diagram 480466 | FP-E-1 |

**THIS PAGE INTENTIONALLY LEFT BLANK**

# APPENDIX E

# TYPE 796318-1 WIDEBAND OUTPUT OPTION (A2)

## E.1 GENERAL DESCRIPTION

The Type 796318-1 Wideband Output option (A2) provides an 8-MHz wide IF signal, centered about 21.4 MHz, to rear panel connector J9 (SM OUT). The wideband output (WBO) is a gain leveled IF signal with a nominal output impedance of 50 ohms.

## E.2 ELECTRICAL DESCRIPTION

The Type 796318-1 WBO option assembly is enclosed in a metal chassis. The supply voltage (+15 Vdc) is supplied via WJ-8615 Motherboard connector, A1J5. Input signals are applied to connector J1 and output signals are present at connector J2.

## E.3 MECHANICAL DESCRIPTION

WBO option Type 796318-1 measures 3.4 inches in length, 0.9 inches in width, and 0.65 inches in height. This assembly contains printed circuit board Part 280515-1 (A2A1), which mounts to the inside of the WBO assembly. The internal components of the WBO assembly may be accessed by removal of a press-on cover. BNC connector J2, SMB connector J1, capacitor C1, and forked terminal E1 are all mounted to the outside of the WBO assembly.

Two cross-head screws secure the WBO assembly to the inside of WJ-8615, Receiver's rear panel. Connector J2 protrudes through a cutout in the receiver rear panel. On the rear panel J2 is given the reference designation of J9.

## E.4 EQUIPMENT SUPPLIED

- Type 796318-1 WBO assembly

## E.5 EQUIPMENT REQUIRED BUT NOT SUPPLIED

- WJ-8615 Receiver

## E.6 CONNECTOR SIGNALS

E.6.1 **J1** - This SMB connector, which has a 50-ohm input impedance, accepts the 21.4 MHz IF signal from the Preamplifier/Converter assembly (A1A13) via Motherboard connection A1P7.

E.6.2 **J2** - This BNC connector provides a wideband output at rear panel connector J9. The wideband output has a 50-ohm output impedance and produces an 8-MHz wide signal, centered about 21.4 MHz, at a nominal output level of -30 dBm.

## E.7 OPERATION

With the Wideband Option installed and the receiver operating, a wideband output is present at rear panel connector J9. With a -75 dBm signal level at the Antenna connector (J10), the wideband output will provide a nominal output level of -30 dBm.

## E.8 CIRCUIT DESCRIPTION

Refer to **Foldout FO-E-1** for the Wideband Output schematic diagram. The IF signal from the Preamplifier/Converter (A1A13) is input at connector J1 of the Wideband Output option (A2). Connector P5 provides the +15 Vdc supply voltage for the WBO circuitry. WBO signals from the Wideband Output assembly are output at connector J2. From J2, the wideband IF signal is directed to receiver rear panel connector J9.

IF signals present at J1 of the Type 796318-1 Wideband Output assembly (A2) are transformer coupled across T2 from E4 to the input of gain controlled amplifier U1. Amplifiers U1, U2, and their associated circuitry form a gain-controlled amplifier that provides approximately 50 dB of gain control range. Gain controlled IF signals are coupled across transformer T1 to a 6 dB attenuator pad before being routed from E2 to connector J2. IF signals at J2 are approximately 8 MHz wide, centered at 21.4 MHz, and have a 50-ohm, nominal, output impedance. The WBO signal level at rear panel connector J9 is typically between -30 dBm and -25 dBm.

## E.9 TYPE 796318-1 WBO (A2) ALIGNMENT PROCEDURES

1. Connect the test equipment as illustrated in **Figure E-1**.

2. Set the signal generator to produce a -60 dBm CW signal at a frequency of 21.4 MHz.

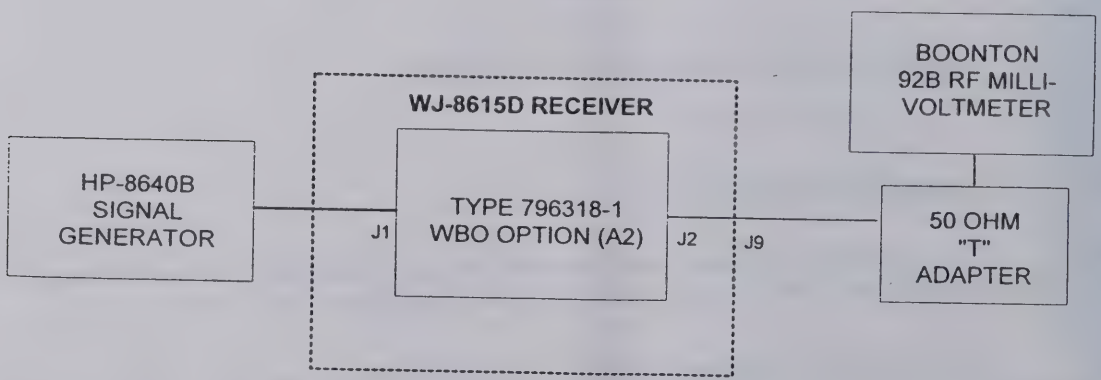



**Figure E-1. WBO Option (A2) Alignment Test, Equipment Connections**

3. Verify the signal level indicated on the RF millivoltmeter is between -30 dBm and -25 dBm. If it is not, adjust R10 to produce a level of -27 dBm. Note this level.

4. While observing the level displayed on the RF millivoltmeter, slowly tune the signal generator to 17.4 MHz and verify that the output level does not vary more than ±2 dB from the level noted in **step 3**.

5. Reset the signal generator frequency to 21.4 MHz and again note the level on the RF millivoltmeter.

6. Slowly tune the signal generator to 25.4 MHz and verify that the level on the RF millivoltmeter does not vary more than ±1 dB from the level noted in **step 5**.

7. Increase the signal generator output level from -60 dBm to -10 dBm, in 10 dB steps, while observing the level on the RF millivoltmeter.

8. Verify the displayed level remains between -30 dBm and -25 dBm.

9. If step 10 is not able to be met over the 50 dB range, readjust R10 and repeat **step 7** through **step 10**.

10. Disconnect the test equipment and reinstall the receiver connectors to their corresponding mating connectors.

## E.10 TYPE 796318-1 WBO (A2) PERFORMANCE TEST

1. Connect the test equipment as illustrated in **Figure E-1**.

2. Set the signal generator to produce a -40 dBm CW signal at a frequency of 21.4 MHz.

3. Verify that the signal level indicated on the RF millivoltmeter is between -30 dBm and -25 dBm. Note this level.

4. While observing the level displayed on the RF millivoltmeter, slowly tune the signal generator to 17.4 MHz and verify that the output level does not vary more than ±1 dB from the level noted in **step 3**.

5. Reset the signal generator frequency to 21.4 MHz and again note the level on the RF millivoltmeter.

6. Slowly tune the signal generator to 25.4 MHz and verify that the level on the RF millivoltmeter does not vary more than ±1 dB from the level noted in **step 5**.

7. Reset the signal generator frequency to 21.4 MHz with an output level of -60 dBm.

8. Verify the level on the RF millivoltmeter is between -30 dBm and -25 dBm.

9. Increase the signal generator output level from -60 dBm to -10 dBm, in 10 dB steps, while observing the level on the RF millivoltmeter.

10. Verify the displayed level remains between -30 dBm and -25 dBm.

11. If step 10 is not able to be met over the 50 dB range, perform the alignment procedure described in **paragraph E.9**.

12. Disconnect the test equipment and reinstall the receiver connectors to their corresponding mating connectors.

## E.11 REPLACEMENT PARTS LIST

### E.11.1 UNIT NUMBERING METHOD

The unit numbering method of assigning reference designations (electrical symbol numbers) has been used to identify assemblies, subassemblies, (and modules) and parts. An example of the unit numbering method follows:

| Subassembly Designation A1 | R1 Class and No. of Item |
|---|---|
| Identify from right to left as: | First (1) resistor (R) of<br>First (1) subassembly (A) |

As shown on the main chassis schematic, components which are an integral part of the main chassis have no subassembly designation.

### E.11.2 REFERENCE DESIGNATION PREFIX

Partial reference designations have been used on the equipment and on the illustrations in this manual. The partial reference designations consist of the class letter(s) and identifying item number. The complete reference designations may be obtained by placing the proper prefix before the partial reference designations. Reference Designation Prefixes are provided on drawings and illustrations in parentheses within the figure titles.

## E.11.3 LIST OF MANUFACTURERS

| Mfr. Code | Name and Address |
|---|---|
| 02114 | Feroxcube Corp.<br>P.O. Box 359<br>Mt. Marion Road<br>Saugerties, NY 12477 |
| 09021 | Airco, Inc.<br>Airco Electronics<br>Bradford, PA 17055 |
| 14632 | BAE SYSTEMS<br>Advanced Systems<br>700 Quince Orchard Road<br>Gaithersburg, MD 20878 |
| 16179 | M/A-COM OMNI Spectra, Inc.<br>Microwave Component Div.<br>21 Continental Blvd.<br>Merrimack, NH 03054-4303 |
| 19505 | Applied Eng. Products, Co.<br>Division of Samarious, Inc.<br>300 Seymour Avenue<br>Derby, CT 06418 |
| 33095 | Spectrum Control, Inc.<br>152 E. Main Street<br>Fairview, PA 16415 |
| 52648 | Plessey Semiconductors<br>1641 Kaiser Avenue<br>Irvine, CA 92714 |
| 56289 | Sprague Electric Company<br>87 Marshall Street<br>North Adams, MA 01247 |
| 59660 | Tusonix, Inc.<br>2155 North Forbes Blvd.<br>Tuscon, AZ 85745 |
| 71279 | Cambridge Thermionic Corp.<br>445 Concord Avenue<br>Cambridge, MA 02138 |
| 73138 | Beckman Instruments, Inc.<br>Helipot Div.<br>2500 Harbor Boulevard<br>Fullerton, CA 92634 |
| 80131 | Electronic Industries Assoc.<br>2001 Eye Street, N.W.<br>Washington, D.C. 20006 |
| 94375 | Plessey Connector Division, Inc.<br>400 Moreland Road<br>Commack, NY 11725 |

## E.11.4 PROVISIONING NOTE - INCONSISTENCIES IN PART NUMBERING CONVENTIONS

The internal computer applications at BAE SYSTEMS Gaithersburg Operations have undergone upgrades to better serve our customers. With this upgrade came alterations to the numbering scheme for parts reporting to an end item. Due to these alterations, minor inconsistencies may exist between identifying parts numbers found on drawings, piece parts, or other documentation. No form fit and function specifications have been altered due to this change in the numbering scheme.

The inconsistencies take two forms. New part number conventions mandate the use of three-digit suffixes for part numbers used within computer applications. Part numbers having single-digit suffixes have been altered by the addition of leading zeroes. Therefore, a piece part with an identifying number having a suffix of "-2" may be represented in a computer-generated document with a part number having a suffix of

"-002". Also the new part numbering convention requires that the base portion of a part number be made up of six digits. Part numbers with base portions with less than six digits are expressed with leading zeroes to meet this requirement. Accordingly, a part number having a base of "34456" may appear as "034456". If you have questions or concerns regarding the configuration identification of piece parts, contact the plant for additional information at 1-800-954-3577.

## E.11.5 PARTS LIST

The parts list which follows contains all electrical parts used in the equipment and certain mechanical parts which are subject to unusual wear or damage. When ordering replacement parts from BAE SYSTEMS, specify the type and serial number of the equipment and the reference designation and description of each part ordered. The list of manufacturers provided in **paragraph E.11.3** and the manufacturer's part number for components are included as a guide to the user of the equipment in the field. These parts may not necessarily agree with the parts installed in the equipment; however, the parts specified in this list will provide satisfactory operation of the equipment. Replacement parts may be obtained from any manufacturer as long as the physical and electrical parameters of the part selected agree with the original indicated part. In the case of components defined by a military or industrial specification, a vendor which can provide the necessary component is suggested as a convenience to the user.

**NOTE**

As improved semiconductors become available, it is the policy of BAE SYSTEMS to incorporate them in proprietary products. For this reason some transistors, diodes and integrated circuits installed in the equipment may not agree with those specified in the parts lists and schematic diagrams of this manual. However, the semiconductors designated in the manual may be substituted in every case with satisfactory results.

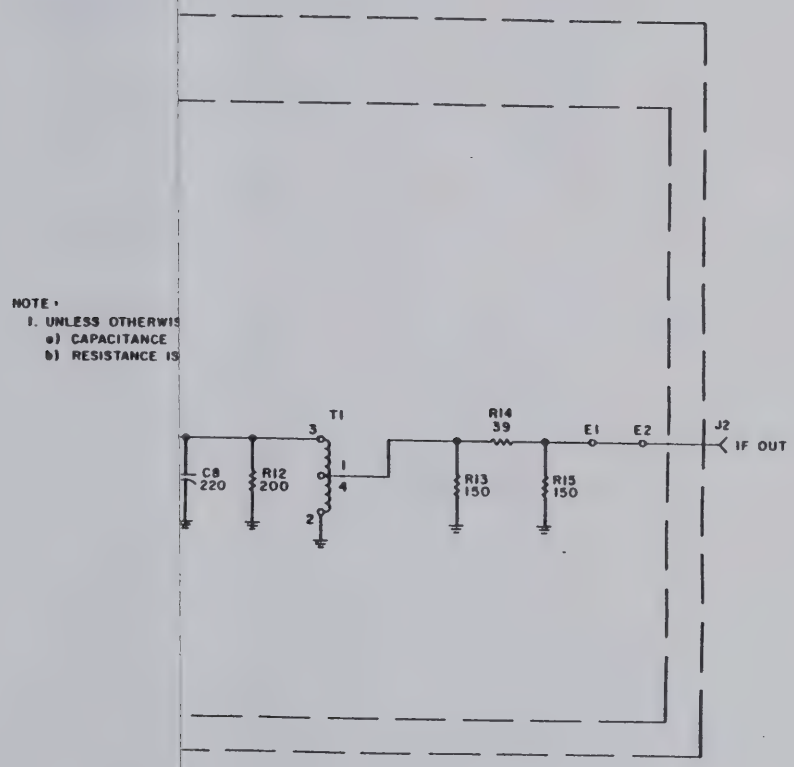
## E.12 TYPE 796318-1 WIDEBAND OUTPUT ASSEMBLY

REF DESIG PREFIX A2

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| | Revision D1 | | | | |
| A1 | WBO 21.4 MHz Amplifier | 1 | 280515-1 | 14632 | |
| C1 | Capacitor, Ceramic, Feedthru: 1000 pF, GMV 150 V | 1 | 713-001-102P | 33095 | |
| E1 | Terminal, Forked | 1 | 140-1941-02-01 | 71279 | |
| J1 | Connector, Receptacle: SMB | 1 | 2012-7511-000 | 19505 | |
| J2 | Connector, Jack: BNC | 1 | 3252-0000-10 | 16179 | |
| VR1 | Diode, Zener: 3.3 V | 1 | 1N746A | 80131 | |

## E.12.1 PART 280515-1 WIDEBAND OUTPUT 21.4 MHZ AMPLIFIER REF DESIG PREFIX A2A1

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| | Revision E1 | | | | |
| C1 | Capacitor, Ceramic, Disc: 4700 pF, 20%, 50 V | 7 | 8121-050-651-472M | 59660 | |
| C2 Thru C5 | Same as C1 | | | | |
| C6 | Capacitor, Electrolytic, Tantalum: 15 ΩF, 20%, 15 V | 1 | 196D156X0015JE3 | 56289 | |
| C7 | Same as C1 | | | | |
| C8 | Capacitor, Ceramic, Monolithic: 220 pF, 5%, 100 | 1 | 8121-100-COGO-221J | 59660 | |
| C9 | Same as C1 | | | | |
| FB1 | Ferrite Bead | 4 | 56-590-65-4A | 02114 | |
| FB2 Thru FB4 | Same as FB1 | | | | |
| R1 | Not Used | | | | |
| R2 | Resistor, Fixed, Film: 220Ω, 5%, 1/8 W | 1 | CF1/8-220 OHMS/J | 09021 | |
| R3 | Resistor, Fixed, Film: 100Ω, 5%, 1/8 W | 1 | CF1/8-100 OHMS/J | 09021 | |
| R4 | Resistor, Fixed, Film: 820Ω, 5%, 1/8 W | 1 | CF1/8-820 OHMS/J | 09021 | |
| R5 | Resistor, Fixed, Film: 10Ω, 5%, 1/4 W | 1 | CF1/4-10 OHMS/J | 09021 | |
| R6 | Resistor, Fixed, Film: 300Ω, 5%, 1/8 W | 1 | CF1/8-300 OHMS/J | 09021 | |
| R7 | Not Used | | | | |
| R8 | Resistor, Fixed, Film: 47 kΩ, 5%, 1/8 W | 1 | CF1/8-47K/J | 09021 | |
| R9 | Resistor, Fixed, Film: 7.5 kΩ, 5%, 1/8 W | 2 | CF1/8-7.5K/J | 09021 | |
| R10 | Resistor, Trimmer, Film: 5 kΩ, 10%, 1/2 W | 1 | 62PAR5K | 73138 | |
| R11 | Resistor, Fixed, Film: 3.3 kΩ, 5%, 1/8 W | 1 | CF1/8-3.3K/J | 09021 | |
| R12 | Resistor, Fixed, Film: 200Ω, 5%, 1/8 W | 1 | CF1/8-200 OHMS/J | 09021 | |
| R13 | Resistor, Fixed, Film: 150Ω, 5%, 1/8 W | 2 | CF1/8-150 OHMS/J | 09021 | |
| R14 | Resistor, Fixed, Film: 39Ω, 5%, 1/8 W | 1 | CF1/8-39 OHMS/J | 09021 | |
| R15 | Same as R13 | | | | |
| T1 | Transformer | 2 | 180204-1 | 14632 | |
| T2 | Same as T1 | | | | |
| U1 | Integrated Circuit | 1 | SL1611C/DP | 52648 | |
| U2 | Integrated Circuit | 1 | SL1432/DP | 94375 | |
| VR1 | Diode, Zener: 3.3V | 1 | 1N746A | 80131 | |




8-1, Wideband Output 21.4 MHz Amplifier (A2),
Diagram 480466 (D)

## E.12.1 PART 280515-1 WIDEBAND OUTPUT 21.4 MHZ AMPLIFIER REF DESIG PREFIX A2A1

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| | Revision E1 | | | | |
| C1 | Capacitor, Ceramic, Disc: 4700 pF, 20%, 50 V | 7 | 8121-050-651-472M | 59660 | |
| C2 Thru C5 | Same as C1 | | | | |
| C6 | Capacitor, Electrolytic, Tantalum: 15 ΩF, 20%, 15 V | 1 | 196D156X0015JE3 | 56289 | |
| C7 | Same as C1 | | | | |
| C8 | Capacitor, Ceramic, Monolithic: 220 pF, 5%, 100 | 1 | 8121-100-COGO-221J | 59660 | |
| C9 | Same as C1 | | | | |
| FB1 | Ferrite Bead | 4 | 56-590-65-4A | 02114 | |
| FB2 Thru FB4 | Same as FB1 | | | | |
| R1 | Not Used | | | | |
| R2 | Resistor, Fixed, Film: 220Ω, 5%, 1/8 W | 1 | CF1/8-220 OHMS/J | 09021 | |
| R3 | Resistor, Fixed, Film: 100Ω, 5%, 1/8 W | 1 | CF1/8-100 OHMS/J | 09021 | |
| R4 | Resistor, Fixed, Film: 820Ω, 5%, 1/8 W | 1 | CF1/8-820 OHMS/J | 09021 | |
| R5 | Resistor, Fixed, Film: 10Ω, 5%, 1/4 W | 1 | CF1/4-10 OHMS/J | 09021 | |
| R6 | Resistor, Fixed, Film: 300Ω, 5%, 1/8 W | 1 | CF1/8-300 OHMS/J | 09021 | |
| R7 | Not Used | | | | |
| R8 | Resistor, Fixed, Film: 47 kΩ, 5%, 1/8 W | 1 | CF1/8-47K/J | 09021 | |
| R9 | Resistor, Fixed, Film: 7.5 kΩ, 5%, 1/8 W | 2 | CF1/8-7.5K/J | 09021 | |
| R10 | Resistor, Trimmer, Film: 5 kΩ, 10%, 1/2 W | 1 | 62PAR5K | 73138 | |
| R11 | Resistor, Fixed, Film: 3.3 kΩ, 5%, 1/8 W | 1 | CF1/8-3.3K/J | 09021 | |
| R12 | Resistor, Fixed, Film: 200Ω, 5%, 1/8 W | 1 | CF1/8-200 OHMS/J | 09021 | |
| R13 | Resistor, Fixed, Film: 150Ω, 5%, 1/8 W | 2 | CF1/8-150 OHMS/J | 09021 | |
| R14 | Resistor, Fixed, Film: 39Ω, 5%, 1/8 W | 1 | CF1/8-39 OHMS/J | 09021 | |
| R15 | Same as R13 | | | | |
| T1 | Transformer | 2 | 180204-1 | 14632 | |
| T2 | Same as T1 | | | | |
| U1 | Integrated Circuit | 1 | SL1611C/DP | 52648 | |
| U2 | Integrated Circuit | 1 | SL1432/DP | 94375 | |
| VR1 | Diode, Zener: 3.3V | 1 | 1N746A | 80131 | |

WJ-8615

# WJ-8615 RECEIVER

## APPENDIX F

## TRACKING PRESELECTOR OPTION

Copyright © BAE SYSTEMS 1993
All Rights Reserved

BAE SYSTEMS
ADVANCED SYSTEMS
700 QUINCE ORCHARD ROAD
GAITHERSBURG, MARYLAND 20878

March 2001

## PROPRIETARY STATEMENT

This document and subject matter disclosed herein are proprietary items to which BAE SYSTEMS retains the exclusive right of dissemination, reproduction, manufacture and sale.

This document is provided to the individual or using organization for their use alone in the direct support of the associated equipment unless permission for further disclosure is expressly granted in writing.

## WARRANTY

Seller warrants for a period of one year from the date of shipment, unless a different period has been agreed upon and incorporated into the Contract, that the products delivered or services rendered will conform to the specifications and be free from defects in workmanship and materials. THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF MERCHANTABILITY, FITNESS FOR PURPOSE, OR OTHER WARRANTIES OR GUARANTIES OF ANY KIND OR DESCRIPTION, WHETHER STATUTORY, EXPRESS, OR IMPLIED. If the goods delivered or services performed fail to conform to the warranty stated in this clause, Seller will correct the nonconformity at its expense by such repair, adjustment, modification, or replacement of the goods or services as Seller deems expedient. THE FOREGOING REMEDY OF BUYER FOR ANY FAILURE OF THE GOODS OR SERVICES TO MEET ANY WARRANTY IS EXCLUSIVE. BUYER EXPRESSLY AGREES THAT THE LIABILITY OF SELLER UNDER ANY WARRANTY SHALL NOT INCLUDE DAMAGE TO OUR LOSS OF PROPERTY OTHER THAN THE GOODS COVERED BY THE CONTRACT; LOSS OF PROFITS OR REVENUE; INCREASED COSTS OF ANY KIND; CLAIMS OF CUSTOMERS OF BUYER; OR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES. As to goods or components where the customer has funded the repair, Seller will warrant as limited above, the repaired portion of the unit for three months from the date of reshipment. EQUIPMENT OR PARTS DESCRIBED AS BEING MANUFACTURED BY OTHERS ARE SOLD BY SELLER AS IS and Buyer must look to the respective manufacturer for any and all claims with regard to said equipment or parts.

# TABLE OF CONTENTS

## APPENDIX F

## TRACKING PRESELECTOR OPTION


| Paragraph | | Page |
|---|---|---|
| F.1 | General Description | F-1 |
| F.2 | Installation | F-1 |
| F.2.1 | Equipment Malfunctions | F-5 |
| F.3 | Operational Test | F-5 |
| F.4 | Operation | F-5 |
| F.4.1 | Remote Operation | F-6 |
| F.4.2 | Local Operation | F-6 |
| F.5 | Circuit Description | F-7 |
| F.5.1 | Functional Description | F-7 |
| F.5.1.1 | RF Section | F-7 |
| F.5.1.2 | Control Section | F-7 |
| F.5.2 | Detailed Circuit Description | F-7 |
| F.5.3 | Alignment | F-11 |
| F.6 | Replacement Parts List | F-11 |
| F.6.1 | Unit Numbering Method | F-11 |
| F.6.2 | Reference Designation Prefix | F-11 |
| F.6.3 | List of Manufacturers | F-11 |
| F.6.4 | Provisioning Note – Inconsistencies In Part Numbering Conventions | F-13 |
| F.6.5 | Replacement Parts List | F-13 |
| F.6.5.1 | Type 8615/PRE Preselector Option | F-14 |
| F.6.5.1.1 | Type 796245-2 Synthesizer Interface | F-15 |
| F.6.5.1.2 | Type 796324-1 Tracking Preselector | F-16 |


## LIST OF TABLES


| Table | | Page |
|---|---|---|
| F-1 | Normal Test Point Indications | F-5 |
| F-2 | CODE, 0, 1, 2 Versus Band Select and Frequency Coverage | F-9 |

## TABLE OF CONTENTS (Continued)

### LIST OF ILLUSTRATIONS


| Figure | | Page |
|---|---|---|
| F-1 | Location of Printed Circuit Boards, WJ-8615 Receiver, (Top View) | F-2 |
| F-2 | Partial Component Side View of the Synthesizer Interface Showing U15 | F-3 |
| F-3 | DC-DC Converter, U15 (Enlarged View) | F-4 |
| F-4 | Tracking Preselector Block Diagram | F-9 |
| F-5 | Type 796324-1 Tracking Preselector, Location of Components | F-17 |


### FOLDOUTS


| Foldout | | Page |
|---|---|---|
| FO-F-1 | Type 796324-1 Tracking Preselector/Control (A1A14) Schematic Diagram 580296 | FP-F-1 |

# APPENDIX F

# TRACKING PRESELECTOR OPTION

## F.1 GENERAL DESCRIPTION

The WJ-8615/PRE Tracking Preselector is a field installable option for the WJ-8615 Receiver. The primary function of this Preselector is to provide extremely narrow bandpass filtering of the RF spectrum between 20 and 500 MHz. Four separate, tunable filter bands are used in the Preselector, each covering a segment of the overall range, plus a 'BYPASS' band. Selection of the appropriate band and filter tuning, is controlled automatically using a 'Tuning Word' provided by the receiver. Should preselector filtering not be desired, the Preselector can be disabled from the front panel, or through the Remote Bus using the mnemonic "BYP". When "PRE OFF" is utilized, the "BYPASS" band of the Preselector is automatically selected. This bypass band provides the added advantage of extending the receiver's lower tuning limit to 2 MHz. However, narrow bandpass filtering does not occur in the extended 2 to 20 MHz frequency range. A 30V dc-dc converter is furnished with the Tracking Preselector to provide the necessary voltage for biasing of the varactor diodes used in the tunable filters.

## F.2 INSTALLATION

Installation of the Tracking Preselector option consists of removing one printed circuit board; installing the Preselector board in the same slot and installing a dc-dc converter on an existing printed circuit board. Two cables are disconnected and two are reconnected.

To install the Preselector option, proceed as follows:

1. Remove the top cover of the WJ-8615 by; removing nine (9) flathead screws. (Captive nuts are used to secure these screws.)

   Lift the rear of the cover about a half-inch and slide the cover several inches to the rear. The cover may now be lifted from the unit.

2. Using **Figure F-1** as a guide, find the location of the RF filter board, Reference Designator A1A14.

3. Disconnect the RF Input coaxial connector at the top rear of the RF filter board.

4. Disconnect the RF filter output coaxial cable from the RF preamplifier/converter input, (A1A14).

5. Remove the RF filter board and its output coaxial cable.

6. Install the Tracking Preselector board in the same card slot which the RF filter was removed. Position the board so that the component side is facing the left side of the cabinet, board connectors down. Press the board connectors firmly into place.

7. Install the output coaxial cable from the Preselector, into the preamplifier/converter RF input jack, to which the RF filter output coaxial was connected.

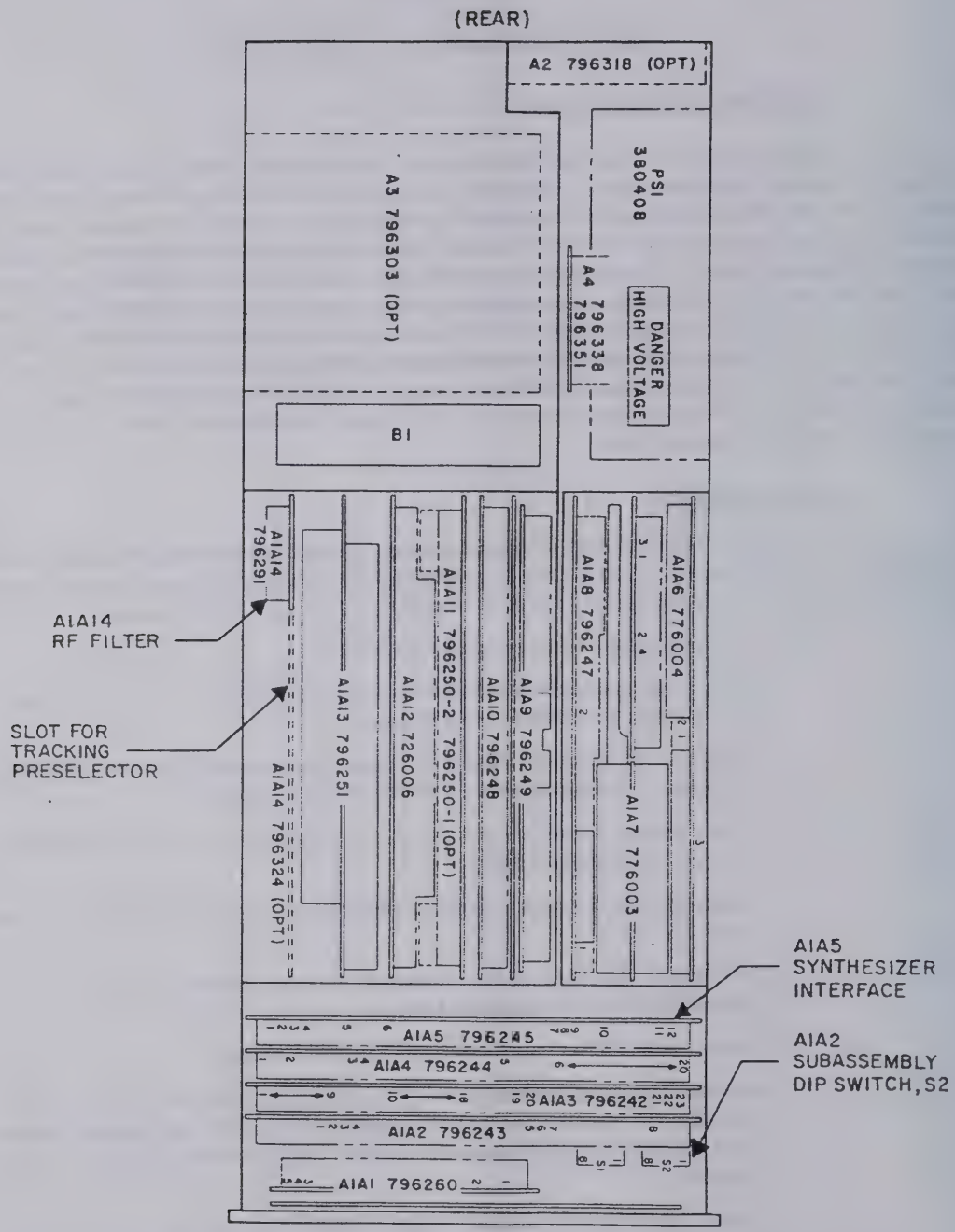



**Figure F-1. Location of Printed Circuit Boards, WJ-8615 Receiver, (Top View)**

8. Connect the incoming RF coaxial cable and connector to input jack J1, at the top rear of the Preselector board.

**NOTE**

THE FOLLOWING STEPS ARE NOT REQUIRED WHEN THE TRACKING PRESELECTOR WAS ORDERED AT THE SAME TIME AS THE WJ-8615 RECEIVER.

9. Refer to **Figure F-1** and determine the board location of the Synthesizer Interface board, Reference Designator A1A5, (fourth plug-in circuit board from the front panel).

10. Remove the A1A5 printed circuit card from the unit.

11. On the component side of the board, notice that in the upper right-hand corner is located an area with designator U15. (Refer to **Figure F-2**, which is a partial illustration of the board.)

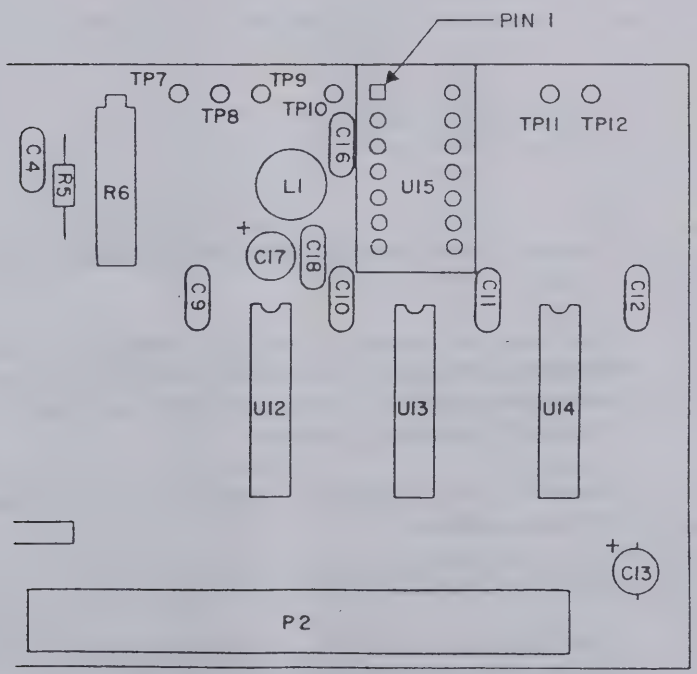



**Figure F-2. Partial Component Side View of the Synthesizer Interface Showing U15**

## F.4.1 REMOTE OPERATION

When the receiver is operated in the REMOTE mode, via the IEEE-488 interface, Preselector status and control is accomplished using the BYP, BYP/, and BYP?, remote commands. Descriptions of these commands are as follows:

| Mnemonic | Hex | Dec | Description |
|---|---|---|---|
| BYP | 3F | 63 | The "BYP" command selects the "BYPASS" mode of operation, disabling the Preselector filters. |
| BYP/ | 40 | 64 | The "BYP/" command selects the Preselector mode. Once active, all control over Preselector tuning and band switching is automatic, requiring no further action by the operator. |
| BYP? | 41 | 65 | This query requests the operational status of the Tracking Preselector. As a response to this command, the receiver will return a "BYP" if the Preselector is in the "BYPASS" mode, or "BYP/" if the Preselector mode is active. |

## F.4.2 LOCAL OPERATION

When the receiver is under local front panel control, the Preselector status can be read or changed by placing the receiver front panel into the definitions mode and selecting the Preselector display, "PrE". This is accomplished by using the following procedure:

a. Starting with the receiver powered "OFF", press in and hold the CONTROL pushbutton, while activating the receiver Power Switch. Continue to hold the CONTROL button in, until the definitions mode is activated, as indicated by a dEF "ON" or dEF "OFF" display in the Frequency Window. Release the CONTROL button when activated.

b. Rotate the front panel tuning knob as required to obtain a dEF "ON" display.

c. Using the UP/DOWN CHANGE buttons, step through the definition functions until the Preselector display is present in the Frequency Window (PrE "ON" or PrE "OFF"). PrE ON indicates that the Preselector mode is active, while PrE OFF indicates that the BYPASS mode is active.

d. Select the desired Preselector status by rotating the tuning knob until the desired status is obtained.

e. To exit the Definitions mode and restore normal front panel operation, press the CONTROL pushbutton. The Preselector status will remain as selected, unless it is changed using the above procedure or by the definitions mode being turned off (dEF OFF), prior to exiting.

## F.5 CIRCUIT DESCRIPTION

### F.5.1 FUNCTIONAL DESCRIPTION

The Tracking Preselector is characterized by the special ability to automatically tune the bandpass filter center frequency so that it tracks with the WJ-8615 receiver 'front end', through the use of a digital 'Tuning Word'. As an aid to describing the Tuning Preselector circuit, the unit may be functionally divided into two basic sections, the RF Section and the Control Section.

#### F.5.1.1 RF Section

The RF section of the Tracking Preselector consists of four electronically tunable bandpass filters, each dedicated to a specific band of frequencies within the 20-500 MHz frequency spectrum, which may be remotely tuned. Each of these filters has a 3 dB bandwidth that is approximately 11% of its center frequency. As the center frequency of a filter is varied over its specified range, (tracking the receiver tuned frequency changes), the percentage bandwidth remains relatively constant.

The Band "A" filter covers 20-49 MHz; Band "B" 49-118 MHz; Band "C" 118-264 MHz; and Band "D" 264-500 MHz. An additional band called "BYPASS" provides a straight-through signal path with no filtering, which permits operation of the receiver from 20 MHz down to 2 MHz. If desired, the "BYPASS" mode may be selected by the operator at any time, from either the front panel or by remote control, should Preselection in the 20-500 MHz range not be desired.

#### F.5.1.2 Control Section

The other part of the Tracking Preselector is the control circuitry. A "Tuning Word" from the WJ-8615 receiver is used to select the proper Preselector Band. The circuits also provide the proper control voltage for the voltage controlled tuning diodes, which are used in the RF section to resonate the various tuned circuits.

### F.5.2 DETAILED CIRCUIT DESCRIPTION

The Tracking Preselector is a WJ-8615 option. Refer to Block Diagram **Figure F-4**, Parts Location **Figure F-5**, and Schematic Diagram **Foldout FO-F-1**.

Control for the Tracking Preselector RF circuits is through the use of a "Tuning Word", provided to the Preselector from the WJ-8615 receiver. The Tuning Word is a 12 bit word, made up of DATA 0 - DATA 9 and CODE 0 and CODE 1, which are the most significant bits (MSB). The 12 bit word is

connected to an Erasable Programmable-Read-Only-Memory (EPROM) U1, address lines. The EPROM is programmed to provide certain proper data, for each "Tuning Word" on its address lines from the receiver.

The data out of the EPROM (as selected by the data on its address lines), is connected to a Digital-To-Analog Converter (D-A), U3. The D-A converter produces a step voltage output dependent upon data received from the EPROM. The information stored in the EPROM is such that the D-A converter will output the proper voltage for the Voltage Controlled Tuning Diodes (VARICAPS), discussed later in these paragraphs. This permits the Tracking Preselector to accurately track the receiver tuning.

A strobe is used to trigger the EPROM and D-A Converter, after the address has been received by the PROM. The CE pin of the D-A Converter is grounded, so the received signal is latched after the completion of the strobe. This keeps the control voltage output of the converter at the proper level for the receiver "tuning word" connected to the EPROM address lines. For every "tuning word" from the receiver, there is a corresponding voltage requirement by the VARICAPS of the selected band. It is the data required by the D-A converter in order to produce this voltage, which is stored in the PROM.

The step voltage output of the D-A converter is connected to the + input of two OP Amps, U4B and U4A. The OP Amps have outputs which have sufficient swing to furnish the voltage required by the VARICAPS. A +30 volt dc-dc converter is used (off card), to produce the required OP Amp potential.

In providing the required potential swing for the varicaps, two OP Amps are used instead of one. The VARICAPS are divided into two groups; group 1 consists of Band "B" and Band "D", connected to the U4B output called "TV 1", and the other group, made up of Band "A" and Band "C" VARICAPS, which are connected to the U4A output called "TV 2". Using the two OP Amps prevents OP Amp loading and provides some isolation between the two preselector groups.

The CODE 0 and CODE 1 bits of the "tuning word" connected to the PROM address lines, are also connected to U2, which is used as a Decoder and Latch. In addition, the decoder uses a third bit, CODE 2 from the receiver tuning word. These three bits provide the decoder input that allows the selection of the proper preselector band. Note that the Decoder CE (Chip Enable) pin is connected to the same strobe line input as the PROM and D-A converter. Thus the decoder band select and D-A converter are timed together. The strobe trigger pulse is LOW, so at the end of the trigger pulse the decoder chip latches the data on the CBA input from the CODE 0, 1 and 2 bits. This keeps the selected preselector band connected until a different preselector band is chosen by the tuning word as received at the U2 decoder input.

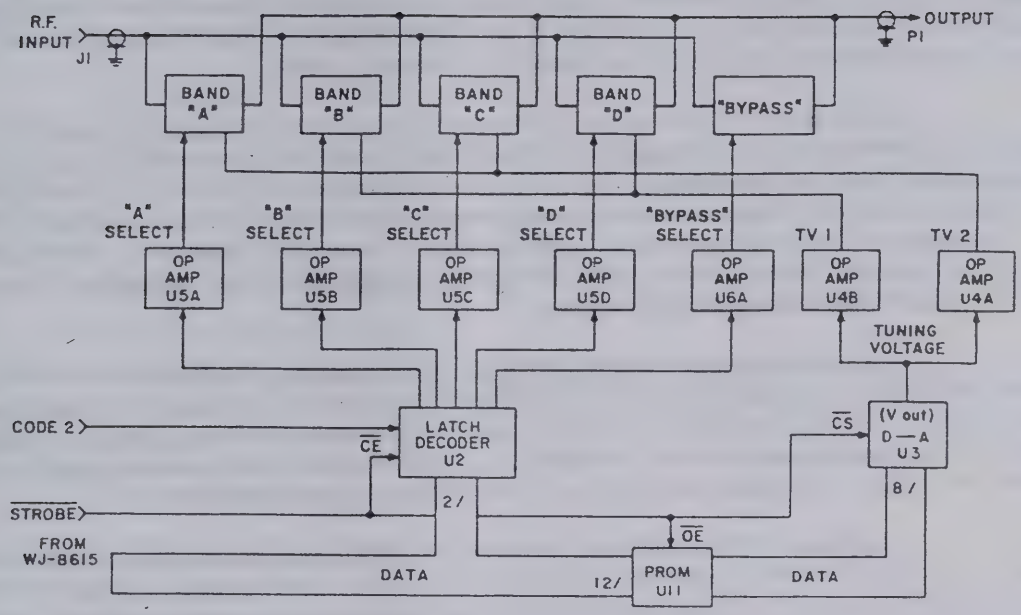



**Figure F-4. Tracking Preselector Block Diagram**

Five decoder outputs are used, one for each preselector band. Also, a separate OP Amp is used for each of the decoder outputs. The OP Amps provide the forward current necessary to connect one of the preselector bands. The non-inverting + input of the amps is used. When the decoder input goes LOW (at the selected output), the OP Amp output goes LOW, selecting the proper preselector band, as described later in these paragraphs. **Table F-2** illustrates the relationship of the decoder input (CODE 0, 1 and 2), verses the selected preselector band and its bandwidth.

**Table F-2. CODE 0, 1, 2 Versus Band Select and Frequency Coverage**

| Code | Preselector Band | Bandpass |
|---|---|---|
| 000 | A | 20 - 49 MHz |
| 001 | B | 49 - 118 MHz |
| 010 | C | 118 - 264 MHz |
| 011 | D | 264 - 500 MHz |
| 100 | "BYPASS" | 2 - 500 MHz |

RF input to the tracking preselector board is at J1. The RF is connected through C1, to the junction of five (5) PIN diodes, CR3, CR4, CR6, CR8 and CR9. Each preselector band is connected to the RF input through one of these PIN diodes. Depending on which diode is forward biased, one band will be connected to the incoming RF signal. Due to the very high impedance of the PIN diodes which are NOT forward biased, the other bands are NOT connected to the incoming signal.

Using Band "C" as an example, the input RF is connected to Preselector Band "C" when PIN diode CR9 is forward biased. Connected to CR9 is L3 and R3, which provide a high impedance for the incoming signal, but a low impedance path for the forward biasing current. Band "C"* select from the U5C OP Amp, furnishes the voltage required to forward bias the CR9 PIN diode. The forward biasing presents a low impedance path for the RF signal from J1 through CR9, to the Band "C" preselector. All other PIN diode inputs are reversed biased under these conditions, keeping the other preselector band inputs DISCONNECTED from the incoming RF signals.

The preselector output circuits operate in a similar manner. Note that each preselector output is connected a PIN diode, CR32, CR33, CR35, CR38 or CR39 through an inductor and capacitor in series. The other end of each of the PIN diodes go to a junction of the other preselector outputs. This junction connects to the output cable (and P1), through C16. Each PIN diode is also connected (through its own inductor and resistor), to the band select input used for that band's RF input PIN diode.

Using Band "C" as an example, the preselector output is coupled through L11 and C14, to PIN diode CR35. When Preselector Band "C" is selected, the Band "C"* select signal is connected to PIN diode CR35 through R15 and L15. This forward biases CR35 and provides a low impedance path to the output of Preselector Band "C", to the output coaxial cable (through C16). All other preselector output PIN diodes have a high impedance path to the coaxial, because all PIN diodes (except CR35), are reversed biased when Preselector Band "C" is selected.

Each of the Preselector Bands share similar circuitry. The primary difference is in part values required to tune the different frequencies. Each of the preselectors use ten (10) VARICAPS to tune the preselector circuits, with the voltage from either the Tune Voltage 1 (TV 1), or Tune Voltage 2 (TV 2), which is controlled by the D-A Converter output. In the case of Band "A" Preselector, THREE VARICAPS connected in parallel are used for each of the 10 VARICAP locations shown on the parts layout and the schematic. They are required in order to provide the relatively large capacitance values necessary for the lower frequencies of 20 to 49 MHz, covered by the "A" Band Preselector. In the case of the Band "B" Preselector, two (2) VARICAPS are used in parallel for each of the 10 VARICAP locations, required to resonate the frequencies of the "B" Band (49 to 118 MHz).

The "BYPASS"* select signal from the decoder (and associated U6A OP Amp), is used to select the "BYPASS" function provided by the Tracking Preselector. This function is provided primarily so that RF input signals below 20 MHz, (which are too low for the Preselector), can bypass the four Preselector Bands and connect directly to the output coaxial(through C16), and P1. When the decoder (and associated OP Amp U6A), present BYPASS* select, it is connected through R13 to the CR6 PIN diode. This forward biases the diode, allowing the RF signal to pass through it, to PIN diode CR33. Note that the CR33 PIN diode is also connected to BYPASS* select through R14, and therefore it too is forward biased. Thus, the incoming signal is connected from J1 through CR6, CR33 and C16, to the output coaxial and P1. There is NO filtering of any signals which pass through the "Bypass" part of the tracking preselector.

In addition to selecting the "Bypass" function of the preselector for frequencies below 20 MHz, the function may also be used for "A-typical" purposes. The "tuning word" can legitimately select the Bypass function. An example of A-typical use is when a 4 MHz or 2 MHz IF bandwidth is being used. In this case, the Preselector should not be used and the Bypass mode selected.

### F.5.3 ALIGNMENT

Alignment of the WJ-8615/PRE Tracking Preselector is determined by the pro-gramming of the EPROM U1. Should alignment be required, the complete Preselector should be returned to the factory for reprogramming.

## F.6 REPLACEMENT PARTS LIST

### F.6.1 UNIT NUMBERING METHOD

The unit numbering method of assigning reference designations (electrical symbol numbers) has been used to identify assemblies, subassemblies (and modules) and parts. An example of the unit numbering method follows:

| Subassembly Designation A1 | R1 Class and No. of Item |
|---|---|
| Identify from right to left as: | First (1) resistor (R) of<br>First (1) subassembly (A) |

As shown on the main chassis schematic, components which are an integral part of the main chassis have no subassembly designation.

### F.6.2 REFERENCE DESIGNATION PREFIX

Partial reference designations have been used on the equipment and on the illustra-tions in this manual. The partial reference designations consist of the class letter(s) and identifying item number. The complete reference designations may be obtained by placing the proper prefix before the partial reference designations. Reference Designation Prefixes are provided on drawings and illustrations in parentheses within the figure titles.

### F.6.3 LIST OF MANUFACTURERS

| Mfr. Code | Name and Address | Mfr. Code | Name and Address |
|---|---|---|---|
| 09021 | Airco Electronics<br>Bradford, PA 16701 | 19505 | Applied Engineering Prod. Co.<br>Division of Samarius Inc.<br>300 Seymour Avenue<br>Derby, CT 06418 |
| 14632 | BAE SYSTEMS<br>Advanced Systems<br>700 Quince Orchard Road<br>Gaithersburg, MD 20878 | 22526 | Berg Electronics<br>Route 83<br>New Cumberland, PA 17070 |

| Mfr. Code | Name and Address |
|---|---|
| 24355 | Analog Devices Inc.<br>P.O. Box 280<br>Norwood, MA 02062 |
| 24546 | Corning Glass Works<br>2155 N. Forbes Blvd.<br>Bradford, PA 16701 |
| 27014 | National Semi-Conductor Corp.<br>2950 San Ysidro Way<br>Santa Clara, CA 95051 |
| 28480 | Hewlett-Packard Company<br>Corporate Headquarters<br>1501 Page Mill Road<br>Palo Alto, CA 94304 |
| 29990 | American Technical Ceramics<br>1 Norden Lane<br>Huntington Station, NY 11746 |
| 50101 | Frequency Sources Inc.<br>16 Maple Road<br>South Chelmsford, MA 01824 |
| 50821 | Interpoint Corporation<br>10301 Willows Road<br>P. O. Box 97005<br>Redmond, WA 98073-9705 |
| 51642 | Centre Engineering Inc.<br>2820 E. College Avenue<br>State College, PA 16801 |
| 52673 | KSW Electronics Corp.<br>South Bedford Street<br>Burlington, MA 01803 |
| 56289 | Sprague Electric Company<br>Marshall Street<br>North Adams, MA 01247 |
| 59660 | Tusonix Inc.<br>550 High Street<br>Suite 107<br>Tuscon, AZ 85745 |
| 7W259 | Tel-Cal Corp.<br>9108 Mayflower Avenue<br>El Paso, TX 79925 |
| 70903 | Belden Corp.<br>415 South Kilpatrick<br>Chicago, IL 60644 |
| 71279 | Cambridge Thermionic Corp.<br>445 Concord Avenue<br>Cambridge, MA 02138 |
| 72982 | Erie Technological Prod., Inc.<br>2155 North Forbes<br>Suite 10718<br>Tuscon, AZ 85705 |
| 80031 | Electra-Midland Corp.<br>22 Columbia Road<br>Morristown, NJ 07960 |
| 81349 | Military Specifications |
| 91506 | Augat, Inc.<br>3 Perry Ave.<br>Attleboro, MA 02703 |
| 93306 | Uniform Tubes Inc.<br>200 W. 7th Avenue<br>Collegeville, PA 19426 |

## F.6.4 PROVISIONING NOTE - INCONSISTENCIES IN PART NUMBERING CONVENTIONS

The internal computer applications at BAE SYSTEMS Gaithersburg Operations have undergone upgrades to better serve our customers. With this upgrade came alterations to the numbering scheme for parts reporting to an end item. Due to these alterations, minor inconsistencies may exist between identifying parts numbers found on drawings, piece parts, or other documentation. No form fit and function specifications have been altered due to this change in the numbering scheme.

The inconsistencies take two forms. New part number conventions mandate the use of three-digit suffixes for part numbers used within computer applications. Part numbers having single-digit suffixes have been altered by the addition of leading zeroes. Therefore, a piece part with an identifying number having a suffix of "-2" may be represented in a computer-generated document with a part number having a suffix of "-002". Also the new part numbering convention requires that the base portion of a part number be made up of six digits. Part numbers with base portions with less than six digits are expressed with leading zeroes to meet this requirement. Accordingly, a part number having a base of "34456" may appear as "034456". If you have questions or concerns regarding the configuration identification of piece parts, contact the plant for additional information at 1-800-954-3577.

## F.6.5 REPLACEMENT PARTS LIST

The parts list which follows contains all electrical parts used in the equipment and certain mechanical parts which are subject to unusual wear or damage. When ordering replacement parts from BAE SYSTEMS, specify the type and serial number of the equipment and the reference designation and description of each part ordered. The list of manufacturers provided in **paragraph F.6.3** and the manufacturer's part number for components are included as a guide to the user of the equipment in the field. These parts may not necessarily agree with the parts installed in the equipment; however, the parts specified in this list will provide satisfactory operation of the equipment. Replacement parts may be obtained from any manufacturer as long as the physical and electrical parameters of the part selected agree with the original indicated part. In the case of components defined by a military or industrial specification, a vendor which can provide the necessary component is suggested as a convenience to the user.

**NOTE**

The component U15, listed on the following parts list, is required by the tracking preselector option, but is not mounted on the preselector circuit board. This component is mounted on the Type 796245 Synthesizer Interface (A1A5).

As improved semiconductors become available, it is the policy of BAE SYSTEMS to incorporate them in proprietary products. For this reason some transistors, diodes and integrated circuits installed in the equipment may not agree with those specified in the parts lists and schematic diagrams of this manual. However, the semiconductors designated in the manual may be substituted in every case with satisfactory results.

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|

## F.6.5.1 Type 8615/PRE Preselector Option

| | | | | | |
|---|---|---|---|---|---|
| A1A5 | Synthesizer Interface Assembly | 1 | 796245-2 | 14632 | |
| A1A14 | Tracking Preselector/Control Assembly | 1 | 796324-1 | 14632 | |

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|

## F.6.5.1.1 Type 796245-2 Synthesizer Interface

REF DESIG PREFIX **A1A5**

Installation of the following component converts the standard Type 796245-1 Synthesizer Interface into the Type 796245-2 version. Refer to the receiver manual for the complete parts list and schematic diagram.

| | | | | |
|---|---|---|---|---|
| U15 | Converter, DC-DC | 1 | D1P515DT | 50821 |

F.6.5.1.2 **Type 796324-1 Tracking Preselector** REF DESIG PREFIX **A1A14**

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| | Revision M1 | | | | |
| C1 | Capacitor, Ceramic, Chip: 5100 pF, 20%, 50 V | 7 | ATC700B512MP50X | 29990 | |
| C2 | Capacitor, Ceramic, Monolithic: 1000 pF, ±2%, 100 V | 15 | 150-100-NPC-102G | 51642 | |
| C3 | Capacitor, Ceramic, Chip: 470 pF, 10%, 200 V | 4 | ATC700B471KP200X | 29990 | |
| C4 | Same as C3 | | | | |
| C5 | Same as C2 | | | | |
| C6 | Same as C2 | | | | |
| C7 | Capacitor, Ceramic, Chip: 1.5 pF, ±0.1 pF, 500 V | 2 | ATC700B1R5BP500X | 29990 | |
| C8 | Capacitor, Ceramic, Chip: 1.3 pF, ±0.1 pF, 500 V | 1 | ATC700B1R3BP500X | 29990 | |
| C9 | Same as C2 | | | | |
| C10 | Same as C2 | | | | |
| C11 | Same as C3 | | | | |
| C12 | Same as C1 | | | | |
| C13 | Capacitor, Ceramic, Disc: .47 µF, 20%, 50 V | 1 | 34452-1 | 14632 | |
| C14 | Same as C3 | | | | |
| C15 | Same as C2 | | | | |
| C16 | Same as C1 | | | | |
| C17 | Capacitor, Ceramic, Disc: 4700 pF, 20%, 50 V | 4 | 8121-050-651-472-M | 59660 | |
| C18 | Same as C1 | | | | |
| C19 | Same as C1 | | | | |
| C20 | Same as C17 | | | | |
| C21 | Same as C2 | | | | |
| C22 | Same as C7 | | | | |
| C23 | Capacitor, Ceramic, Chip: 1.0 pF, ±0.1 pF, 500 V | 1 | ATC100B1R0BP500X | 29990 | |
| C24 | Same as C2 | | | | |
| C25 | Same as C17 | | | | |
| C26 | Same as C1 | | | | |
| C27 | Same as C1 | | | | |
| C28 | Same as C17 | | | | |
| C29 | Capacitor, Ceramic, Disc: 0.1 µF, 20%, 50 V | 9 | 34475-1 | 14632 | |
| C30 | Capacitor, Ceramic, Disc: .01 µF, 20%, 50 V | 2 | 34453-1 | 14632 | |
| C31 | Capacitor, Electrolytic, Tantalum: 22 µF, 20%, 10 V | 1 | 199D226X0010CE3 | 56289 | |
| C32 Thru C35 | Same as C29 | | | | |
| C36 | Not Used | | | | |
| C37 | Same as C29 | | | | |
| C38 | Capacitor, Electrolytic, Tantalum: 4.7 µF, 20%, 35 V | 1 | 196D475X0035JE3 | 56289 | |
| C39 | Same as C30 | | | | |
| C40 | Capacitor, Ceramic, Monolithic: 300 pF, ±2%, 100 V | 2 | 150-100-NPO-301G | 51642 | |
| C41 | Same as C40 | | | | |
| C42 | Same as C29 | | | | |

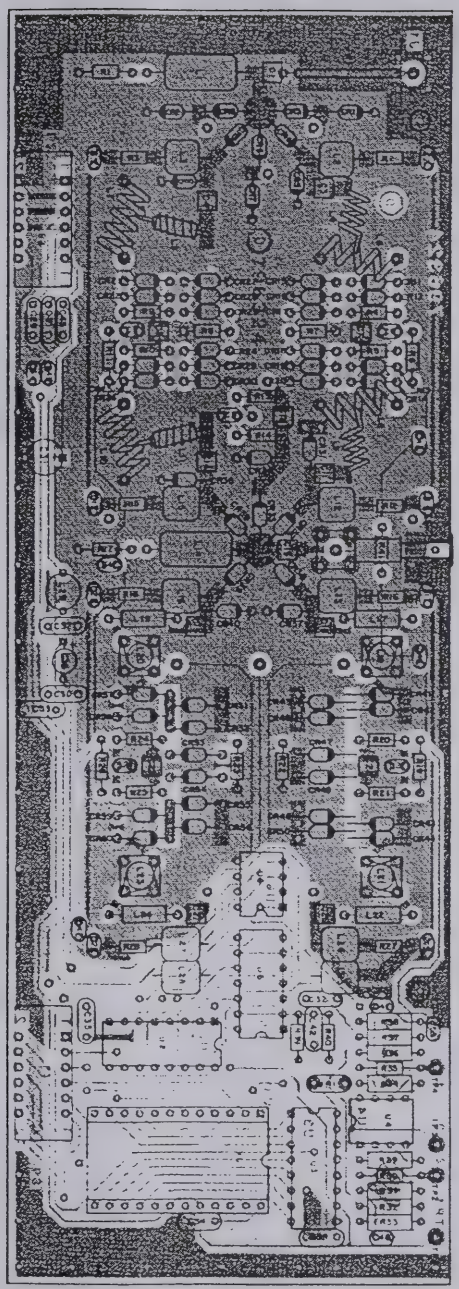


**Figure F-5. Type 796324-1 Tracking Preselector, Location of Components**

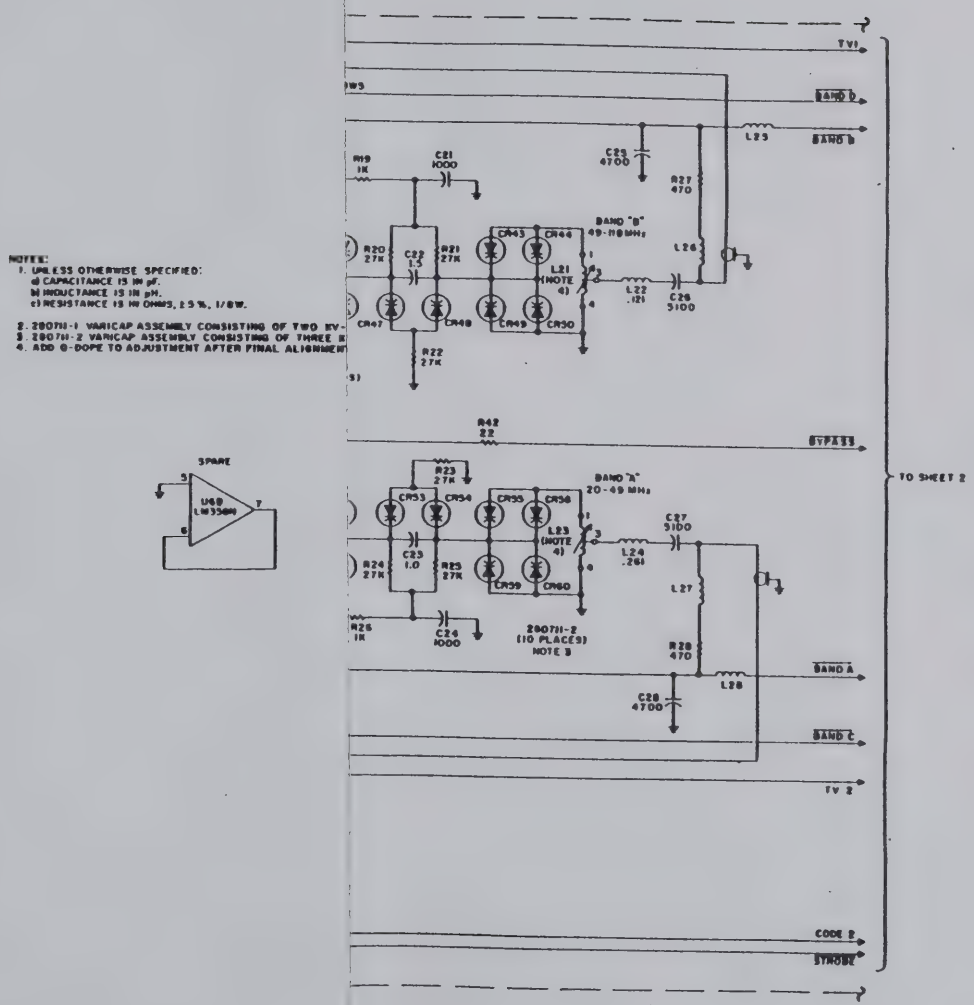
| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| | | | REF DESIG PREFIX **A1A14** | | |
| C43 | Same as C2 | | | | |
| C44 | Same as C2 | | | | |
| C45 | Same as C29 | | | | |
| C46 Thru C50 | Same as C2 | | | | |
| C51 | Same as C29 | | | | |
| CR1 | Diode | 10 | 5082-3039 | 28480 | |
| CR2 | Same as CR1 | | | | |
| CR3 | Diode | 10 | 841320 | 14632 | |
| CR4 | Same as CR3 | | | | |
| CR5 | Same as CR1 | | | | |
| CR6 | Same as CR3 | | | | |
| CR7 | Same as CR1 | | | | |
| CR8 | Same as CR3 | | | | |
| CR9 | Same as CR3 | | | | |
| CR10 | Same as CR1 | | | | |
| CR11 | Diode | 10 | U11-3102 | 52673 | |
| CR12 Thru CR20 | Same as CR11 | | | | |
| CR21 | Diode | 60 | KV3901 | 52673 | |
| CR22 Thru CR30 | Same as CR21 | | | | |
| CR31 | Same as CR1 | | | | |
| CR32 | Same as CR3 | | | | |
| CR33 | Same as CR3 | | | | |
| CR34 | Same as CR1 | | | | |
| CR35 | Same as CR3 | | | | |
| CR36 | Same as CR1 | | | | |
| CR37 | Same as CR1 | | | | |
| CR38 | Same as CR3 | | | | |
| CR39 | Same as CR3 | | | | |
| CR40 | Same as CR1 | | | | |
| CR41 | Diode Assembly | 10 | 280711-1 | 14632 | |
| CR42 Thru CR50 | Same as CR41 | | | | |
| CR52 Thru CR60 | Same as CR51 | | | | |
| CR51 | Diode Assembly | 10 | 280711-2 | 14632 | |
| CR52 Thru CR60 | Same as CR51 | | | | |

REF DESIG PREFIX **A1A14**

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| J1 | Connector, Receptacle | 1 | 1009-7511-000 | 19505 | |
| JP1 | Jumper, Plug | 1 | 461-2872-01-03-1 | 71279 | |
| L1 | Coil, Fixed | 2 | 170134-1 | 14632 | |
| L2 | Coil, Fixed | 10 | 190187-1 | 14632 | |
| L3 | Same as L2 | | | | |
| L4 | Coil | 1 | 180343-2 | 14632 | |
| L5 | Coil, Fixed: .040 µH, ±1% | 2 | L8-0R-040 | 7W259 | |
| L6 | Coil | 1 | 180342-2 | 14632 | |
| L7 | Coil | 1 | 180341-1 | 14632 | |
| L8 | Coil | 1 | 180342-1 | 14632 | |
| L9 | Coil | 1 | 180343-1 | 14632 | |
| L10 | Coil | 1 | 180341-2 | 14632 | |
| L11 | Same as L5 | | | | |
| L12 | Same as L2 | | | | |
| L13 | Same as L2 | | | | |
| L14 | Same as L1 | | | | |
| L15 | Same as L2 | | | | |
| L16 | Same as L2 | | | | |
| L17 | Coil, Fixed: .121 µH, ±1% | 2 | L10-0R121 | 7W259 | |
| L18 | Coil Assembly | 2 | 280519-1 | 14632 | |
| L19 | Coil, Fixed: .261 µH, ±1% | 2 | L10-0R261 | 7W259 | |
| L20 | Coil Assembly | 2 | 280693-1 | 14632 | |
| L21 | Same as L18 | | | | |
| L22 | Same as L17 | | | | |
| L23 | Same as L20 | | | | |
| L24 | Same as L19 | | | | |
| L25 Thru L28 | Same as L2 | | | | |
| L29 | Coil, Fixed: 1.0 mH, 10% | 1 | 553-3635-37 | 71279 | |
| P1 | Connector Plug | 1 | 2105-7521-005 | 19505 | |
| P2 | Receptacle Assembly | 2 | 66527-006 | 22526 | |
| P3 | Same as P2 | | | | |
| R1 | Resistor, Fixed, Film: 1.5 kΩ, 5%, 1/8 W | 3 | CF1/8-1.5K/J | 09021 | |
| R2 | Resistor, Fixed, Film: 470Ω, 5%, 1/8 W | 10 | CF1/8-470 OHMS/J | 09021 | |
| R3 | Same as R2 | | | | |
| R4 | Resistor, Fixed, Film: 27 kΩ, 5%, 1/8 W | 12 | C3-27K-5PCT | 24546 | |
| R5 | Same as R4 | | | | |
| R6 | Resistor, Fixed, Film: 1.0 kΩ, 5%, 1/8 W | 7 | CF1/8-1.0K/J | 09021 | |
| R7 Thru R10 | Same as R4 | | | | |
| R11 | Same as R6 | | | | |

REF DESIG PREFIX **A1A14**

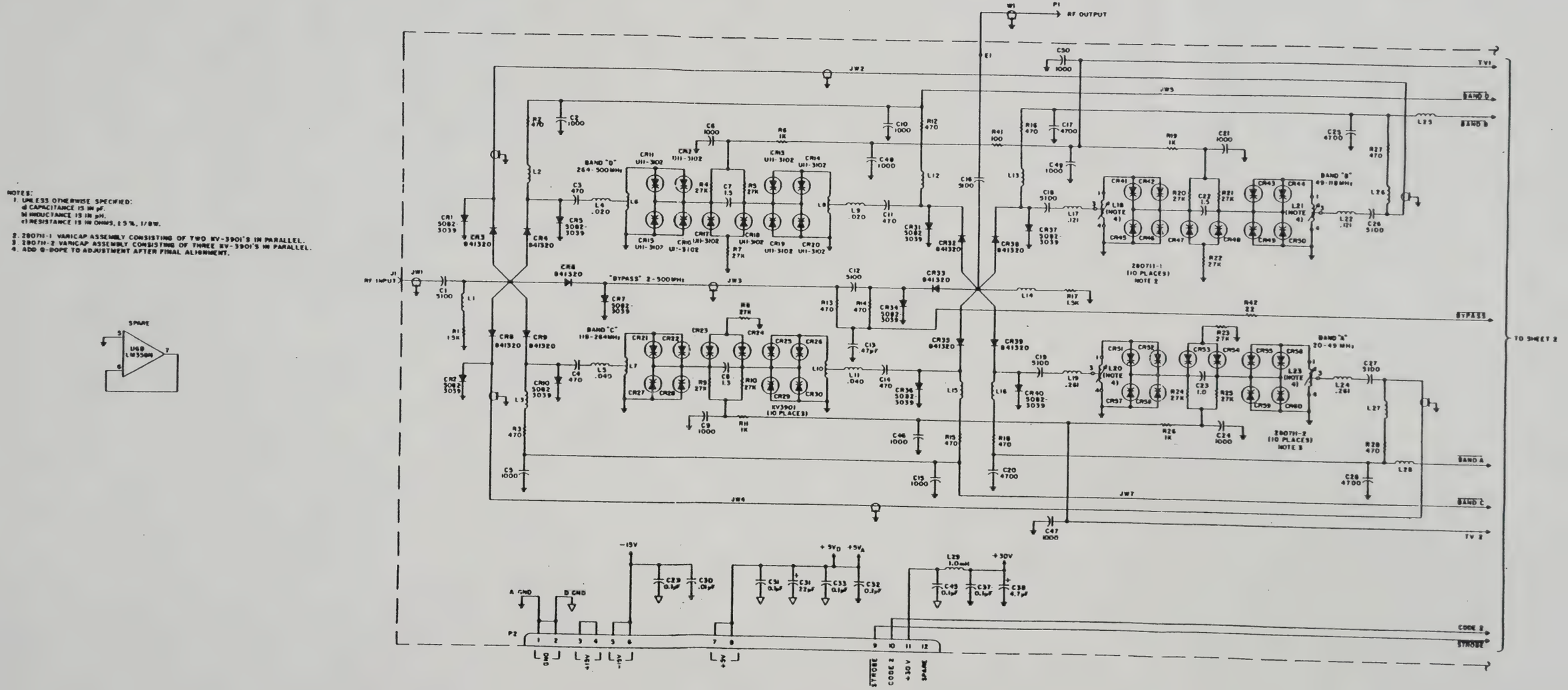
| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| R12 Thru R16 | Same as R2 | | | | |
| R17 | Same as R1 | | | | |
| R18 | Same as R2 | | | | |
| R19 | Same as R6 | | | | |
| R20 Thru R25 | Same as R4 | | | | |
| R26 | Same as R6 | | | | |
| R27 | Same as R2 | | | | |
| R28 | Same as R2 | | | | |
| R29 | Resistor, Fixed, Film: 10 kΩ, 1%, 1/10 W | 2 | RN55C1002F | 81349 | |
| R30 | Same as R6 | | | | |
| R31 | Resistor, Fixed, Film: 16.2 kΩ, 1%, 1/10 W | 2 | RN55C1622F | 81349 | |
| R32 | Resistor, Fixed, Film: 121 kΩ, 1%, 1/4 W | 2 | MF4C/121K/F | 80031 | |
| R33 | Resistor, Fixed, Film: 1.82 kΩ, 1%, 1/10 W | 2 | RN55C1821F | 81349 | |
| R34 | Same as R29 | | | | |
| R35 | Same as R6 | | | | |
| R36 | Same as R31 | | | | |
| R37 | Same as R32 | | | | |
| R38 | Same as R33 | | | | |
| R39 | Same as R1 | | | | |
| R40 | Same as R6 | | | | |
| R41 | Resistor, Fixed, Film: 100Ω, 5%, 1/8 W | 1 | CF1/8-100 OHMS/J | 09021 | |
| U1 | Integrated Circuit (EPROM) | 1 | TBA | 14632 | |
| U2 | Integrated Circuit | 1 | MM74HC137N | 27014 | |
| U3 | Integrated Circuit | 1 | AD558KN | 24355 | |
| U4 | Integrated Circuit | 2 | LM358N | 27014 | |
| U5 | Integrated Circuit | 1 | LM324N | 27014 | |
| U6 | Same as U4 | | | | |
| W1 | Cable Assembly | 1 | 280570-2 | 14632 | |



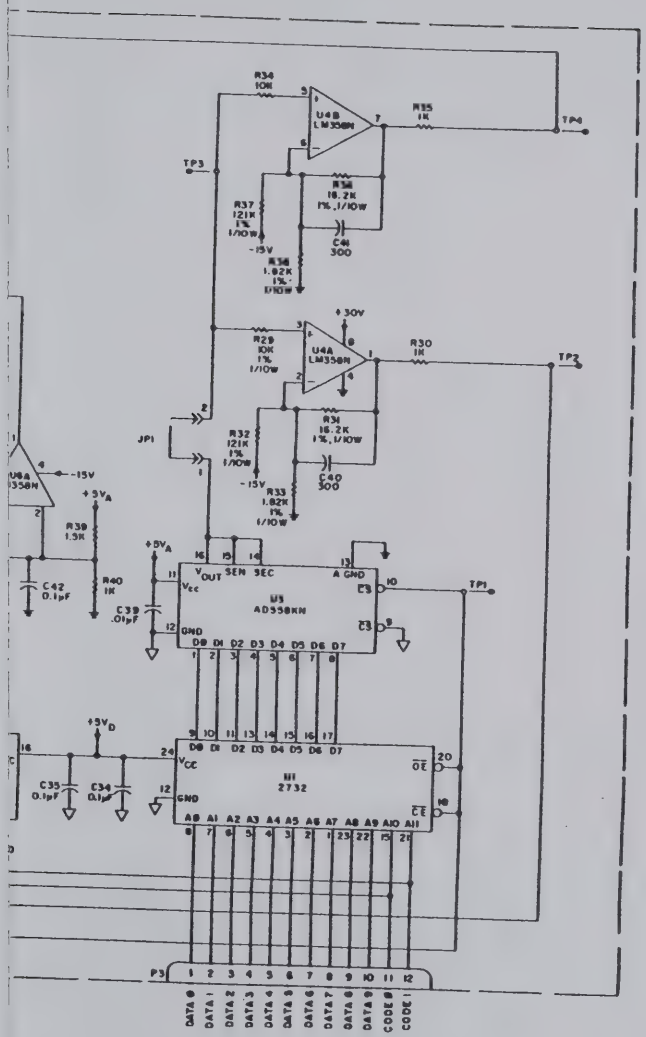

pe 796324-1 Tracking Preselector/Control (A1A14)
hematic Diagram 580296 (Sheet 1 of 2) (G)

REF DESIG PREFIX **A1A14**

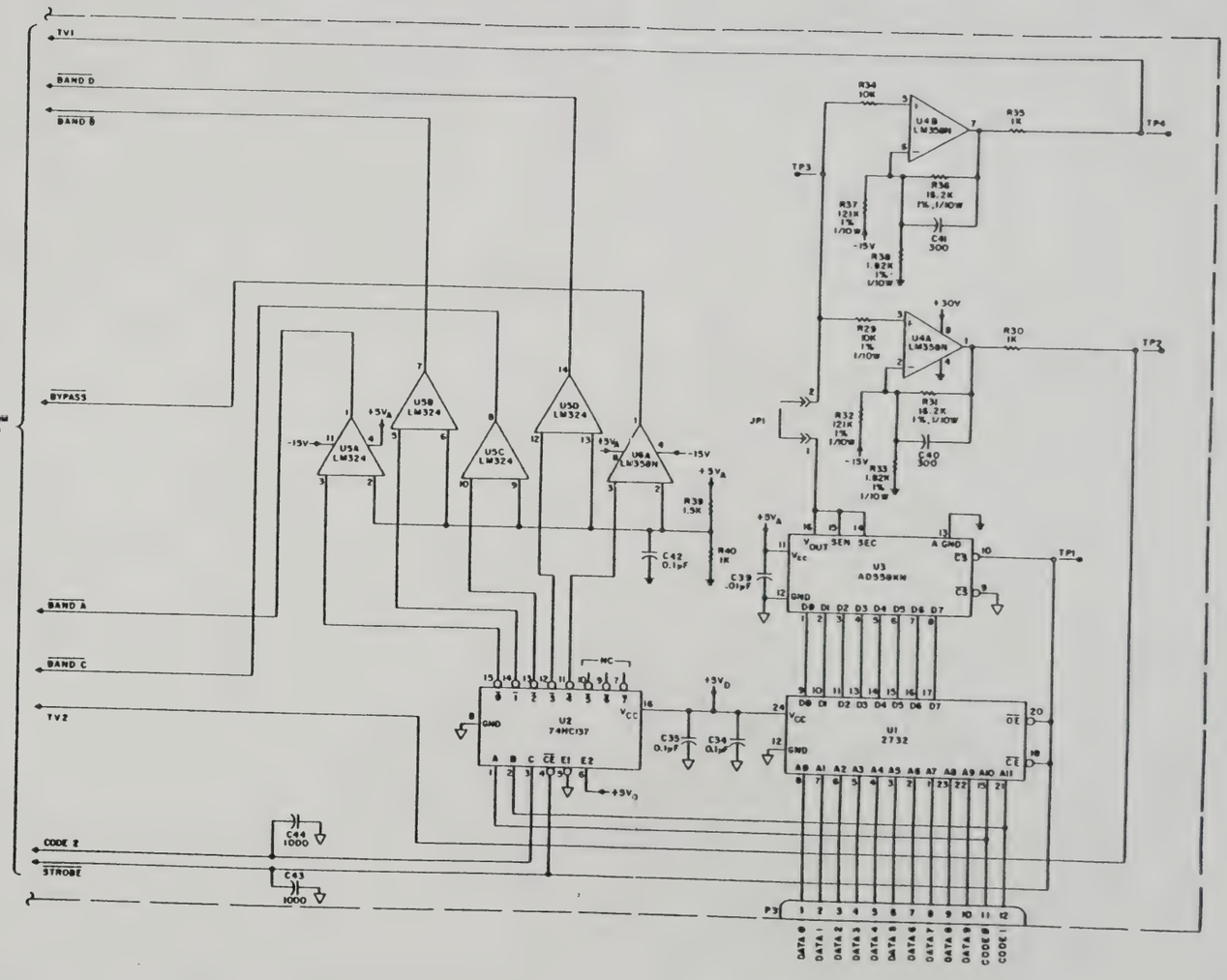
| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| R12 Thru R16 | Same as R2 | | | | |
| R17 | Same as R1 | | | | |
| R18 | Same as R2 | | | | |
| R19 | Same as R6 | | | | |
| R20 Thru R25 | Same as R4 | | | | |
| R26 | Same as R6 | | | | |
| R27 | Same as R2 | | | | |
| R28 | Same as R2 | | | | |
| R29 | Resistor, Fixed, Film: 10 kΩ, 1%, 1/10 W | 2 | RN55C1002F | 81349 | |
| R30 | Same as R6 | | | | |
| R31 | Resistor, Fixed, Film: 16.2 kΩ, 1%, 1/10 W | 2 | RN55C1622F | 81349 | |
| R32 | Resistor, Fixed, Film: 121 kΩ, 1%, 1/4 W | 2 | MF4C/121K/F | 80031 | |
| R33 | Resistor, Fixed, Film: 1.82 kΩ, 1%, 1/10 W | 2 | RN55C1821F | 81349 | |
| R34 | Same as R29 | | | | |
| R35 | Same as R6 | | | | |
| R36 | Same as R31 | | | | |
| R37 | Same as R32 | | | | |
| R38 | Same as R33 | | | | |
| R39 | Same as R1 | | | | |
| R40 | Same as R6 | | | | |
| R41 | Resistor, Fixed, Film: 100Ω, 5%, 1/8 W | 1 | CF1/8-100 OHMS/J | 09021 | |
| U1 | Integrated Circuit (EPROM) | 1 | TBA | 14632 | |
| U2 | Integrated Circuit | 1 | MM74HC137N | 27014 | |
| U3 | Integrated Circuit | 1 | AD558KN | 24355 | |
| U4 | Integrated Circuit | 2 | LM358N | 27014 | |
| U5 | Integrated Circuit | 1 | LM324N | 27014 | |
| U6 | Same as U4 | | | | |
| W1 | Cable Assembly | 1 | 280570-2 | 14632 | |




FO-F-1. Type 796324-1 Tracking Preselector/Control (A1A14)
Schematic Diagram 580296 (Sheet 1 of 2) (G)




Type 796324-1 Tracking Preselector/Control (A1A14)
Schematic Diagram 580296 (Sheet 2 of 2) (G)
FP-F-3/(FP-F-4 blank)




FO-F-1. Type 796324-1 Tracking Preselector/Control (A1A14)
Schematic Diagram 580296 (Sheet 2 of 2) (G)

## PROPRIETARY STATEMENT

This document and subject matter disclosed herein are proprietary items to which BAE SYSTEMS retains the exclusive right of dissemination, reproduction, manufacture and sale.

This document is provided to the individual or using organization for their use alone in the direct support of the associated equipment unless permission for further disclosure is expressly granted in writing.

## WARRANTY

Seller warrants for a period of one year from the date of shipment, unless a different period has been agreed upon and incorporated into the Contract, that the products delivered or services rendered will conform to the specifications and be free from defects in workmanship and materials. THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF MERCHANTABILITY, FITNESS FOR PURPOSE, OR OTHER WARRANTIES OR GUARANTIES OF ANY KIND OR DESCRIPTION, WHETHER STATUTORY, EXPRESS, OR IMPLIED. If the goods delivered or services performed fail to conform to the warranty stated in this clause, Seller will correct the nonconformity at its expense by such repair, adjustment, modification, or replacement of the goods or services as Seller deems expedient. THE FOREGOING REMEDY OF BUYER FOR ANY FAILURE OF THE GOODS OR SERVICES TO MEET ANY WARRANTY IS EXCLUSIVE. BUYER EXPRESSLY AGREES THAT THE LIABILITY OF SELLER UNDER ANY WARRANTY SHALL NOT INCLUDE DAMAGE TO OUR LOSS OF PROPERTY OTHER THAN THE GOODS COVERED BY THE CONTRACT; LOSS OF PROFITS OR REVENUE; INCREASED COSTS OF ANY KIND; CLAIMS OF CUSTOMERS OF BUYER: OR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES. As to goods or components where the customer has funded the repair, Seller will warrant as limited above, the repaired portion of the unit for three months from the date of reshipment. EQUIPMENT OR PARTS DESCRIBED AS BEING MANUFACTURED BY OTHERS ARE SOLD BY SELLER AS IS and Buyer must look to the respective manufacturer for any and all claims with regard to said equipment or parts.

# TABLE OF CONTENTS

## APPENDIX G

## WJ-8615 SELECTED AUDIO OUTPUT OPTION


| Paragraph | | Page |
|---|---|---|
| G.1 | General Description | G-1 |
| G.2 | Installation | G-1 |
| G.2.1 | Unpacking and Inspection | G-2 |
| G.3 | Operational Test | G-3 |
| G.4 | Operation | G-3 |
| G.5 | Circuit Description | G-3 |
| G.5.1 | Functional Description | G-3 |
| G.5.1.1 | Block Diagram | G-4 |
| G.5.2 | Detailed Circuit Description | G-4 |
| G.5.3 | Alignment | G-4 |
| G.5.4 | Equipment Malfunctions | G-6 |
| G.6 | Replacement Parts List | G-6 |
| G.6.1 | Unit Numbering Method | G-6 |
| G.6.2 | Reference Designation Prefix | G-6 |
| G.6.3 | Provisioning Note – Inconsistencies in Part Numbering Conventions | G-6 |
| G.6.4 | Reference Parts List | G-7 |
| G.6.5 | List of Manufacturers | G-7 |
| G.6.6 | Type 796464-1 Selected Audio Output Assembly | G-8 |


## LIST OF TABLES


| Table | | Page |
|---|---|---|
| G-1 | Connector J1 (Mates with P21) Pin Connections | G-5 |


## LIST OF ILLUSTRATIONS


| Figure | | Page |
|---|---|---|
| G-1 | Rear Panel Illustrating J14 | G-2 |
| G-2 | Selected Audio Output Block Diagram | G-5 |

**THIS PAGE LEFT INTENTIONALLY BLANK**

# APPENDIX G

# WJ-8615 SELECTED AUDIO OUTPUT OPTION

## G.1 GENERAL DESCRIPTION

The WJ-8615 Selected Audio Output (SAO) feature is a field option. The primary purpose of the option is to provide a means for the WJ-8610A Receiver Controller to select the audio output from any receiver in the Controller's System. When selected, the receivers audio will be available to the operator at the Controller. Audio output from all receivers in the System OTHER than the selected one, will be inhibited from the Controller receiver audio input line.

## G.2 INSTALLATION

Installation of the Selected Audio Output consists of installing one PC card, connecting one cable plug and setting one switch.

To install the Selected Audio Output Option, proceed as follows:

1. Remove the top cover of the WJ-8615 receiver by: removing nine (9) flathead screws. (Captive nuts are used to secure these screws.)

   Lift the rear of the cover about a half-inch and slide the cover several inches to the rear. The cover may then be removed from the receiver.

2. Use **Figure G-1** to locate the press-in plug used to cover the option hole marked "J14", on the rear panel of the receiver.

   Remove this cover by pressing it out from the inside of the receiver.

3. Look at the Selected Audio Output (SAO) unit and notice that the printed circuit card of the unit is attached with a bracket to a female, panel mount BNC connector.

4. Remove the nut on the connector, and install the BNC connector and circuit board in hole "F14", from inside of the receiver. Secure the connector and circuit board to the hole labeled "J14" on the rear panel using the nut removed earlier from the BNC connector. Tighten the nut securely.

5. Look for plug P21 on the end of a six wire cable, which will be located near the BNC connector installed at J14. P21 is installed on the SAO board at the matching connector.

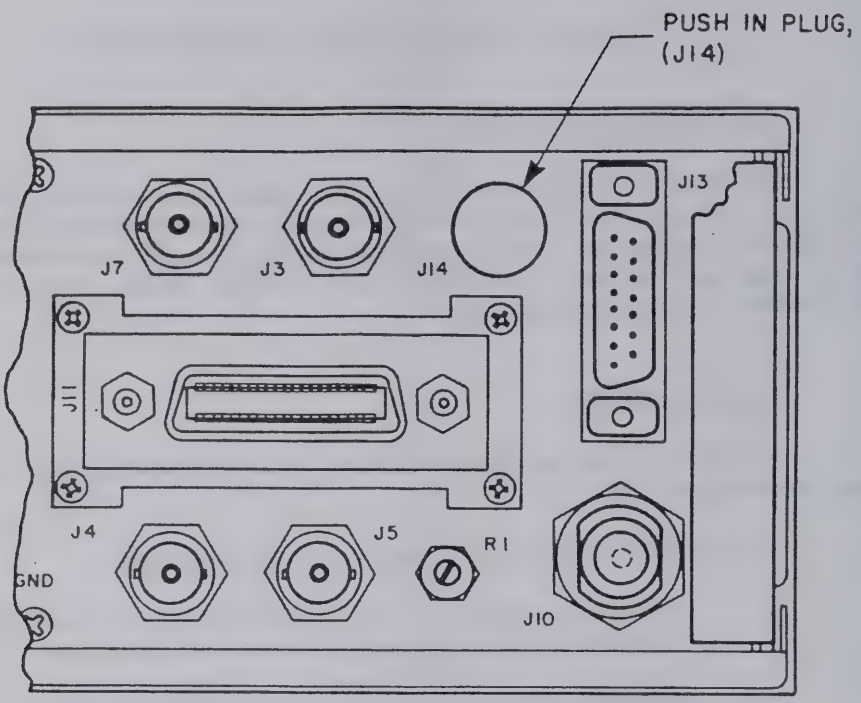



**Figure G-1. Rear Panel Illustrating J14**

6. Locate the Option Dip Switch "92", which is at the top of receiver, near the front panel. Locate position number "7" of this switch and set the switch position to "OPEN". This will inform the software that the option has been installed and is available to the WJ-8610A Controller.

7. Reinstall the top cover of the receiver and the nine (9) flat-head screws.

8. This completes installation of the Selected Audio Output Option.

## G.2.1 UNPACKING AND INSPECTION

Examine the shipping carton for damage before unpacking equipment. If the carton exterior appears to be damaged, try to have the carrier's agent present during unpacking of the equipment. If for some reason this is impossible, retain all packing material and shipping containers for the carrier's inspection, if damage to the equipment is evident after unpacking. Also, verify that the equipment supplied is as listed on the shipment slip. Contact BAE SYSTEMS or your BAE SYSTEMS Advanced Systems representative if there is a discrepancy or shortage.

## G.3 OPERATIONAL TEST

The Selected Audio Output Option was designed to be used with the WJ-8610A Receiver Controller. In order to give the option an operational test, a Controller is required. If a Controller is available, connect the Controller to the receiver(s), at connector jack J14. (Follow instructions in the WJ-861A-2 Supplement Manual for connection of the Controller and receivers in the system.)

Note that there is no 'LOCAL' operation of the SAO. It is operated only by Remote control of the WJ-8610 Receiver Controller. To check out the SAO option, a WJ-8610A Receiver Controller, HP-85, or other device is required. Using one of these devices, proceed as follows:

1. Tune the receiver to an incoming signal.
2. Set the COR to "ZERO".
3. Make sure that the signal audio is available at the Audio Jack of the Receiver.
4. With the Receiver Controller (or other device), issue an "SAO" command.
5. The received signal audio should now ALSO be available at the SAO output, J14.
6. With the Receiver Controller (or other device), issue an "SAO/" command (Selected Audio OFF).
7. The audio signal should no longer be available.

## G.4 OPERATION

Once installed in the receiver, no other adjustments or controls are required to use the Selected Audio Output Option. The Receiver Controller will select or deselect the receiver audio output as required.

## G.5 CIRCUIT DESCRIPTION

### G.5.1 FUNCTIONAL DESCRIPTION

The Selected Audio Output Option is a miniature printed circuit board, containing parts required to switch the audio output of the receiver to a common receiver audio line, either on or off. Operation is such that only one receiver audio output will be on the 'audio line' at any given time.

### G.5.1.1 Block Diagram

A Block Diagram of the Switched Audio Output Option is shown in **Figure G-2**. The audio output from the receiver is connected to the SAO option as the "Audio In". This is at connector J1 on the Option card. (The connections for each pin of this connector is given in **Table G-1**.) The audio is connected to the output of the receiver (at J14) only if instructed by the software at the WJ-8610A Receiver Controller.

When a command is sent to the receiver by the Controller to connect the receiver audio to the common receiver 'Audio Line', the command arrives at the SAO card, which causes the solid state switch on the card to switch, connecting the audio from the receiver, through the solid state switch, to jack J14 at the rear panel of the receiver.

The audio will remain connected to the 'Audio Line', until the Receiver Controller sends a 'deselect' command to the receiver, instructing it to disconnect the audio. Note that connection of the audio output to the 'audio line' does NOT affect the receiver's 'local' audio, at the Line Audio or Headphone Jack.

## G.5.2 DETAILED CIRCUIT DESCRIPTION

The Selected Audio Output Option Parts List is given in **Section G.6.4** and the Schematic is shown in **Section G.6.5**.

Power for the Solid State switch enters the SAO card at the connector, J1. Plus 15 Vdc at pin 6, minus 15 Vdc at pin 1 and ground on pin 3. The Solid State Switch (SSS), used is a single pole-single-through type, controlled by a high/low input control signal on pin 1 of the SSS. This signal (from software) enters the SAO card on pin 2 of J1.

The audio output of the receiver is connected to the SAO card at pins 4 and 5 of connector J1. The 'hot' audio lead is pin 5, while the ground lead for the audio line is pin 4. When the software receives a command (SAO) from the Receiver Controller to connect this receivers audio on the 'audio line' (J14), the Solid State Switch connects the 'hot' audio lead at pin 5 of U1, to J14 from the switch output at pin 6 of U1.

Resistor R1 provides a load for the incoming control signal for U1, while capacitors C1, C2, C3, and C4 are used as bypassing. R2 presents a 620 ohm load for the audio, should there be an inadvertent short at the output jack J14 or in the audio line which it is connected to. Essentially, the 'audio line' is a high impedance line to the Controller. Coaxial with BNC connectors is used for this 'line'.

## G.5.3 ALIGNMENT

There is NO alignment or adjustments to the Selected Audio Output Option required.

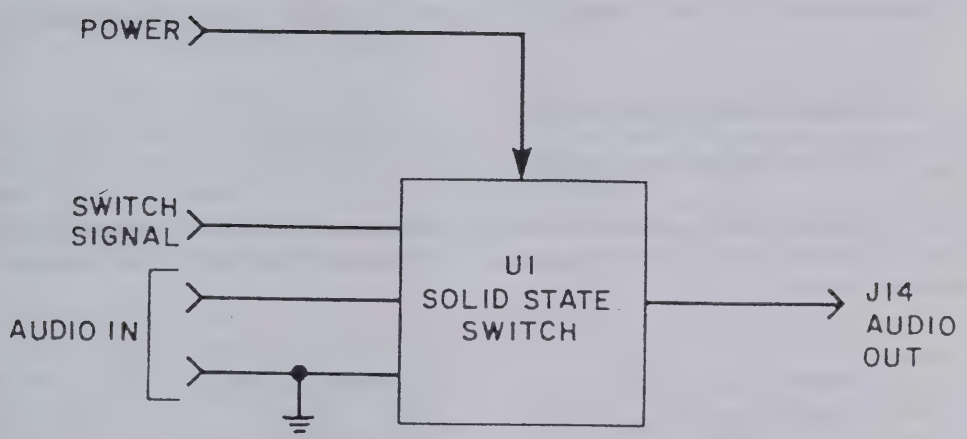



**Figure G-2 Selected Audio Output Block Diagram**

**Table G-1. Connector J1 (Mates with P21) Pin Connections**

| Pin No. | Connection |
|---|---|
| 1 | -15 Vdc for Solid State Switch |
| 2 | Serial Output (Software Signal) |
| 3 | Ground |
| 4 | Audio In (Hot) |
| 5 | Audio In (Ground) |
| 6 | +15 Vdc for Solid State Switch |

### G.5.4 EQUIPMENT MALFUNCTIONS

The WJ-8615-SAO Option was thoroughly inspected and tested prior to shipment. If malfunctions are encountered after following the recommended installation procedures, verify that the inter-unit cables are installed properly. If there still appears to be a problem with the equipment, contact your BAE SYSTEMS representative or the BAE SYSTEMS Advanced Systems, Gaithersburg Operation, Gaithersburg, Maryland, to prevent possible warranty voiding prior to understanding any corrective maintenance action.

## G.6 REPLACEMENT PARTS LIST

### G.6.1 UNIT NUMBERING METHOD

The unit numbering method of assigning reference designations (electrical symbol numbers) has been used to identify assemblies, subassemblies, (and modules), and parts. An example of the unit numbering method follows:

| Subassembly Designation A1 | R1 Class and No. of Item |
|---|---|
| Identify from right to left as: | First (1) resistor (r) of<br>First (1) subassembly (A). |

As shown on the main chassis schematic, components which are an integral part of the main chassis have no subassembly designation.

### G.6.2 REFERENCE DESIGNATION PREFIX

Partial reference designations have been used on the equipment and on the illustrations in this manual. The partial reference designations consist of the class letter(s) and identifying item number. The complete reference designations may be obtained by placing the proper prefix before the partial reference designations. Reference Designation Prefixes are provided on drawings and illustrations in parentheses within the figure titles.

### G.6.3 PROVISIONING NOTE - INCONSISTENCIES IN PART NUMBERING CONVENTIONS

The internal computer applications at BAE SYSTEMS Gaithersburg Operations have undergone upgrades to better serve our customers. With this upgrade came alterations to the numbering scheme for parts reporting to an end item. Due to these alterations, minor inconsistencies may exist between identifying parts numbers found on drawings, piece parts, or other documentation. No form fit and function specifications have been altered due to this change in the numbering scheme.

The inconsistencies take two forms. New part number conventions mandate the use of three-digit suffixes for part numbers used within computer applications. Part numbers having single-digit suffixes have been altered by the addition of leading zeroes. Therefore, a piece part with an identifying number having

a suffix of "-2" may be represented in a computer-generated document with a part number having a suffix of "-002". Also the new part numbering convention requires that the base portion of a part number be made up of six digits. Part numbers with base portions with less than six digits are expressed with leading zeroes to meet this requirement. Accordingly, a part number having a base of "34456" may appear as "034456". If you have questions or concerns regarding the configuration identification of piece parts, contact the plant for additional information at 1-800-954-3577.

## G.6.4 REFERENCE PARTS LIST

The Parts List which follows contains all electrical parts used in the equipment (which are in addition to the parts already in the WJ-8615 Manual), and certain mechanical parts which are subject to unusual wear or damage. When ordering replacement parts from BAE SYSTEMS, specify the type and serial number of the equipment and the reference designation and description of each part ordered. The list of manufacturers provided in the main manual and the manufacturers part number for components are included as a guide to the user of the equipment in the field.

These parts may not necessarily agree with the parts installed in the equipment; however, the parts specified in this Replacement Parts List will prove satisfactory operation of the equipment. Replacement parts may be obtained from any manufacturer as long as the physical and electrical parameters of the part selected agree with the original indicated part. In the case of components defined by a military or industrial specification, a vender which can provide the necessary component is suggested as a convenience to the user.

**NOTE**

As improved semiconductors become available, it is the policy of BAE SYSTEMS to incorporate them in proprietary products. For this reason some transistors, diodes and integrated circuits installed in the equipment may not agree with those specified in the parts lists and schematic diagrams of this manual. However, the semiconductors designated in this manual may be substituted in every case with satisfactory results.

## G.6.5 LIST OF MANUFACTURERS

| Mfr. Code | Name and Address |
|---|---|
| 17856 | Siliconix, Inc.<br>2201 Laurel Wood Road<br>Santa Clara, CA 95054 |

## G.6.6 TYPE 796464-1 SELECTED AUDIO OUTPUT ASSEMBLY REF DESIG PREFIX A1

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| | Revision B1 | | | | |
| C1 | Capacitor, Ceramic, Disc: .1 µF, 20%, 50 V | 2 | 34475-1 | 14632 | |
| C2 | Capacitor, Electrolytic, Tantalum: 4.7 µF, 20%, 35 V | 2 | 196D475X0035JE3 | 56289 | |
| C3 | Same as C1 | | | | |
| C4 | Same as C2 | | | | |
| J1 | Header Assembly | 1 | 87220-6 | 00779 | |
| J14 | Connector Modified | 1 | 180428-1 | 14632 | |
| R1 | Resistor, Fixed, Film: 1.0 kΩ, 5%, 1/4 W | 1 | CF1/4-1K/J | 09021 | |
| R2 | Resistor, Fixed, Composition: 620Ω, 5%, 1/2 W | 1 | RCR20G621JS | 81349 | |
| U1 | Integrated Circuit, SW | 1 | DG200BP | 17856 | |

# APPENDIX H

# WJ-8615 VHF/UHF COMPACT RECEIVER

# HIGH FREQUENCY EXTENDER

**BAE SYSTEMS**
**ADVANCED SYSTEMS**
**700 QUINCE ORCHARD ROAD**
**GAITHERSBURG, MARYLAND 20878**

March 2001

## PROPRIETARY STATEMENT

This document and subject matter disclosed herein are proprietary items to which BAE SYSTEMS retains the exclusive right of dissemination, reproduction, manufacture and sale.

This document is provided to the individual or using organization for their use alone in the direct support of the associated equipment unless permission for further disclosure is expressly granted in writing.

## WARRANTY

Seller warrants for a period of one year from the date of shipment, unless a different period has been agreed upon and incorporated into the Contract, that the products delivered or services rendered will conform to the specifications and be free from defects in workmanship and materials. THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF MERCHANTABILITY, FITNESS FOR PURPOSE, OR OTHER WARRANTIES OR GUARANTIES OF ANY KIND OR DESCRIPTION, WHETHER STATUTORY, EXPRESS, OR IMPLIED. If the goods delivered or services performed fail to conform to the warranty stated in this clause, Seller will correct the nonconformity at its expense by such repair, adjustment, modification, or replacement of the goods or services as Seller deems expedient. THE FOREGOING REMEDY OF BUYER FOR ANY FAILURE OF THE GOODS OR SERVICES TO MEET ANY WARRANTY IS EXCLUSIVE. BUYER EXPRESSLY AGREES THAT THE LIABILITY OF SELLER UNDER ANY WARRANTY SHALL NOT INCLUDE DAMAGE TO OUR LOSS OF PROPERTY OTHER THAN THE GOODS COVERED BY THE CONTRACT; LOSS OF PROFITS OR REVENUE; INCREASED COSTS OF ANY KIND; CLAIMS OF CUSTOMERS OF BUYER; OR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES. As to goods or components where the customer has funded the repair, Seller will warrant as limited above, the repaired portion of the unit for three months from the date of reshipment. EQUIPMENT OR PARTS DESCRIBED AS BEING MANUFACTURED BY OTHERS ARE SOLD BY SELLER AS IS and Buyer must look to the respective manufacturer for any and all claims with regard to said equipment or parts.

## TABLE OF CONTENTS

## APPENDIX H

## WJ-8615 HIGH FREQUENCY EXTENDER OPTION


| Paragraph | | Page |
|---|---|---|
| H.1 | General Description | H-1 |
| H.2 | Electrical Characteristics | H-1 |
| H.3 | Mechanical Characteristics | H-2 |
| H.4 | Installation and Operation | H-2 |
| H.4.1 | Installation | H-2 |
| H.4.2 | Operation | H-3 |
| H.5 | Detailed Circuit Description | H-3 |
| H.6 | Maintenance | H-4 |
| H.6.1 | Performance Test | H-4 |
| H.6.2 | Provisioning Note – Inconsistencies in Part Numbering Conventions | H-5 |
| H.7 | List of Manufacturers | H-5 |
| H.8 | Replacement Parts List | H-5 |
| H.9 | Type 796291-2 RF Input Filter Assembly (A1A14) | H-6 |


## LIST OF TABLES


| Table | | Page |
|---|---|---|
| H-1 | WJ-8615 Specification Changes for the HFE Option | H-1 |


## LIST OF ILLUSTRATIONS


| Figure | | Page |
|---|---|---|
| H-1 | Type 796291-2 RF Input Filter Block Diagram | H-1 |
| H-2 | HFE Option Performance Test, Equipment Connections | H-4 |


## LIST OF ILLUSTRATIONS


| Foldout | | Page |
|---|---|---|
| FO-H-1 | Type 796291-2, RF Input Filter A1A14, Schematic Diagram 380852 | FP-H-1 |

**THIS PAGE INTENTIONALLY LEFT BLANK**

# APPENDIX H

# WJ-8615 HIGH FREQUENCY EXTENDER OPTION

## H.1 GENERAL DESCRIPTION

The WJ-8615/HFE High Frequency Extender Option extends the low end of the tuning range of the WJ-8615 Receiver to 2 MHz. This allows the WJ-8615 Receiver to tune over a range of 2 to 500 MHz.

## H.2 ELECTRICAL CHARACTERISTICS

Refer to **Figure H-1** for a block diagram of the Type 796291-2 RF Input Filter.

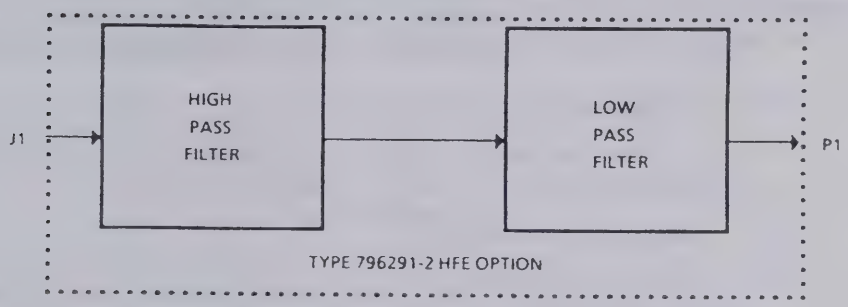



**Figure H-1. Type 796291-2 RF Input Filter Block Diagram**

RF Input Filter Type 796291-2 is a passive, LC-type, band-pass filter, containing two filters. The first of the two filters is a high-pass filter and the second filter is a low-pass filter. Together, these two filters pass frequencies between 2 and 500 MHz.

Refer to **Table H-1** for WJ-8615 Receiver specifications that change due to the installation of the HFE Option.

**Table H-1. WJ-8615 Specification Changes for the HFE Option**

| | | |
|---|---|---|
| Noise Figure | 15 | dB |
| 2nd Order Intercept Point | +5 | dBm |
| 3rd Order Intercept Point | -5 | dBm |

## H.3 MECHANICAL CHARACTERISTICS

The WJ-8615/HFE consists of a Type 796291-2 RF Input Filter. It is 2.93 inches long and 2 inches wide. The actual filter components are located under a 2.25 inch long by 1 inch wide metal cover. This cover is attached to the RF Input Filter Assembly by two phillips head screws. A 12-pin connector attached to the RF Input Filter Assembly is used to secure the filter to the WJ-8615 Receiver Motherboard (A1). This connector attaches to XA14A of the Motherboard.

## H.4 INSTALLATION AND OPERATION

### H.4.1 INSTALLATION

Installation of the WJ-8615/HFE Option consists of installing a Type 796291-2 RF Input Filter (A1A14). The following steps generically describe the procedure for installing the 8615/HFE Option into a receiver belonging to the WJ-8615 family. Refer to the receiver instruction manual for differing front panel indications and nomenclature. It is important to understand that, since the HFE Option is installed in the same slot as the Tracking Preselector Option (PRE), these two options are mutually exclusive.

1. Turn the receiver power off.
2. Unscrew the phillips head screws securing the top protective cover to the receiver.
3. Remove the top cover.
4. Disconnect the RF Input coaxial antenna connector at the top rear of the RF Filter board (Type 796291-1). Refer to Figures in **Section V** of the WJ-8615 Instruction Manual for the component locations.
5. Disconnect the RF Filter output coaxial cable W1 from E1 of the RF Input Filter (Type 796291-1).
6. Remove the RF Input Filter board.
7. Locate cable W4 from rear panel antenna connector and disconnect the SMB connector end of cable W4.
8. Connect the SMB connector of cable W4 to J1 of the RF Input Filter Assembly (Type 796291-2).
9. Connect cable assembly W1 to E1 of RF Input Filter assembly (Type 796291-2).
10. Connect P1 of cable W1 to connector J3 of the Preamplifier/Converter Assembly (A1A13).

11. Gently insert the RF Input Filter Assembly (Type 796291-2) into the mating connector (XA14A) on the receiver motherboard.

12. Set position 5 of switch S1 (located on the IEEE-488/Interrupt Assembly A1A2) to the open position. This enables the HFE Option.

13. Replace the top protective cover and secure the cover to the receiver with the phillips head screws removed in step 2.

14. Turn the receiver power "ON", while holding the MENU key pressed in. This places the receiver in the definitions mode.

15. Press the INC key until "DEF" is displayed. If "NO" is displayed to the right of "DEF", the receiver takes its configuration from DIP switches S1 and S2 on the IEEE-488/Interrupt Assembly.

16. Rotate the tuning wheel until "YES" is displayed to the right of "DEF". This allows the receiver configuration to be controlled from the front panel.

17. Press the INC key until "HF" is visible.

18. Verify "YES" is displayed to the right of "HF". This indicates that the HFE Option is enabled.

19. If "YES" is not displayed to the right of "HF", select "YES" with the tuning wheel. This enables the HFE Option.

20. Press the ENTER key to terminate the definitions mode of operation.

This completes the installation of the HFE Option in the WJ-8615 Receiver. The receiver is now capable of tuning down to 2 MHz.

### H.4.2 OPERATION

The only difference in the operation of the WJ-8615 receiver with and without the WJ-8615/HFE Option is that the receiver can be tuned down to 2 MHz with the WJ-8615/HFE Option installed. For a detailed description of receiver operation refer to the appropriate section of the WJ-8615 Receiver Instruction Manual.

## H.5 DETAILED CIRCUIT DESCRIPTION

The reference designation for the RF Input Filter Assembly is A1A14. Refer to **Foldout FO-F-1** for the Type 796291-2 RF Input Filter schematic diagram.

RF signals present at the rear panel antenna connector J10 (J9 in the WJ-8615TC) are routed through cable W4 to connector J1 of the RF Input Filter Assembly. These RF signals are first high pass filtered and then low pass filtered. The output of the RF Input Filter is passed to the Preamplifier/Converter (A1A13).

The high pass filter is made up of C1, L1, and L2. After being high pass filtered, the RF signal is then low pass filtered. The low pass filter is made up of C2, C3, C4, L3, and L4. The overall attenuation of the Type 796291-2 RF Input Filter is 0.5 dB. RF signals at E1 are routed through cable W1 to the Preamplifier/Converter Assembly (A1A13).

## H.6 MAINTENANCE

### H.6.1 PERFORMANCE TEST

1. Connect the test equipment as illustrated in **Figure H-2**.
2. Set the test equipment to view frequencies between 2-500 MHz.
3. Verify the displayed response is flat (less than 0.5 dB of ripple) and has less than 0.5 dB of insertion loss.
4. Disconnect the test equipment and reconnect the cables to their proper mating connectors.

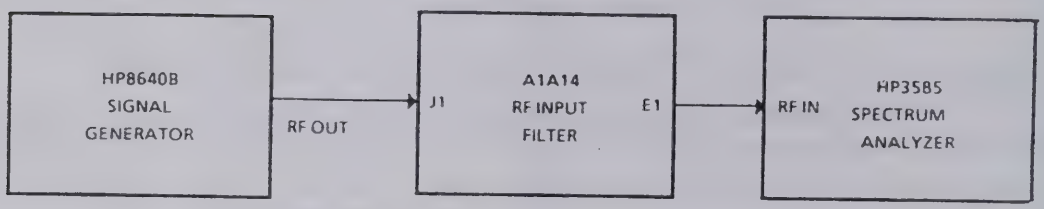



**Figure H-2. HFE Option Performance Test, Equipment Connections**

## H.6.2 PROVISIONING NOTE - INCONSISTENCIES IN PART NUMBERING CONVENTIONS

The internal computer applications at BAE SYSTEMS Gaithersburg Operations have undergone upgrades to better serve our customers. With this upgrade came alterations to the numbering scheme for parts reporting to an end item. Due to these alterations, minor inconsistencies may exist between identifying parts numbers found on drawings, piece parts, or other documentation. No form fit and function specifications have been altered due to this change in the numbering scheme.

The inconsistencies take two forms. New part number conventions mandate the use of three-digit suffixes for part numbers used within computer applications. Part numbers having single-digit suffixes have been altered by the addition of leading zeroes. Therefore, a piece part with an identifying number having a suffix of "-2" may be represented in a computer-generated document with a part number having a suffix of "-002". Also the new part numbering convention requires that the base portion of a part number be made up of six digits. Part numbers with base portions with less than six digits are expressed with leading zeroes to meet this requirement. Accordingly, a part number having a base of "34456" may appear as "034456". If you have questions or concerns regarding the configuration identification of piece parts, contact the plant for additional information at 1-800-954-3577.

## H.7 LIST OF MANUFACTURERS

| Mfr. Code | Name and Address | Mfr. Code | Name and Address |
|---|---|---|---|
| 14632 | BAE SYSTEMS<br>Advanced Systems<br>700 Quince Orchard Road<br>Gaithersburg, MD 20878 | 29990 | American Technical Ceramics<br>1 Norden Lane<br>Huntington Station, NY 11746 |
| 19505 | Applied Engineering Products<br>300 Seymour Avenue<br>Derby, CT 06418 | 51642 | Centre Engineering, Inc.<br>State College, PA 16801 |

## H.8 REPLACEMENT PARTS LIST

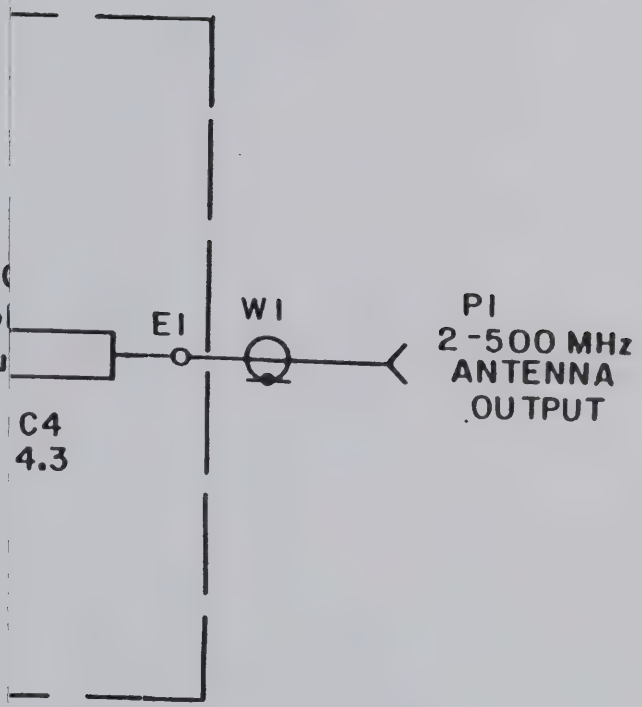
The following parts list is for the WJ-8615/HFE Option only. For parts lists for other options or WJ-8615 Receivers refer to the appropriate WJ-8615 VHF/UHF Compact Receiver Instruction Manual or the appropriate appendix.

## H.9 TYPE 796291-2 RF INPUT FILTER ASSEMBLY

REF DESIG PREFIX **A1A14**

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| | Revision D1 | | | | |
| C1 | Capacitor, Ceramic, Monolithic: 16000 pF, 2%, 100 V | 1 | 200-100-NPO-162G | 51642 | |
| C2 | Capacitor, Ceramic: 4.3 pF, .5 pF, 500 V | 2 | ATC700B4R3DP500X | 29990 | |
| C3 | Capacitor, Ceramic: 8.2 pF, .25 pF, 500 V | 1 | ATC700B8R2CP500X | 29990 | |
| C4 | Same as C2 | | | | |
| J1 | Connector, Receptacle | 1 | 1009-7511-000 | 19505 | |
| L1 | Coil, Fixed: 4.7µH, 10% | 2 | 1537-28 | 99800 | |
| L2 | Same as L1 | | | | |
| L3 | Coil, Fixed | 2 | 170160-1 | 14632 | |
| L4 | Same as L3 | | | | |
| P1 | Connector, Plug | 1 | 2105-7521-005 | 19505 | |
| W1 | Cable Assembly | 1 | 280570-1 | 14632 | |

NOTES:
1. UNLESS OTHERWISE SPEC
a) CAPACITANCE IS IN p
b) INDUCTANCE IS IN µ



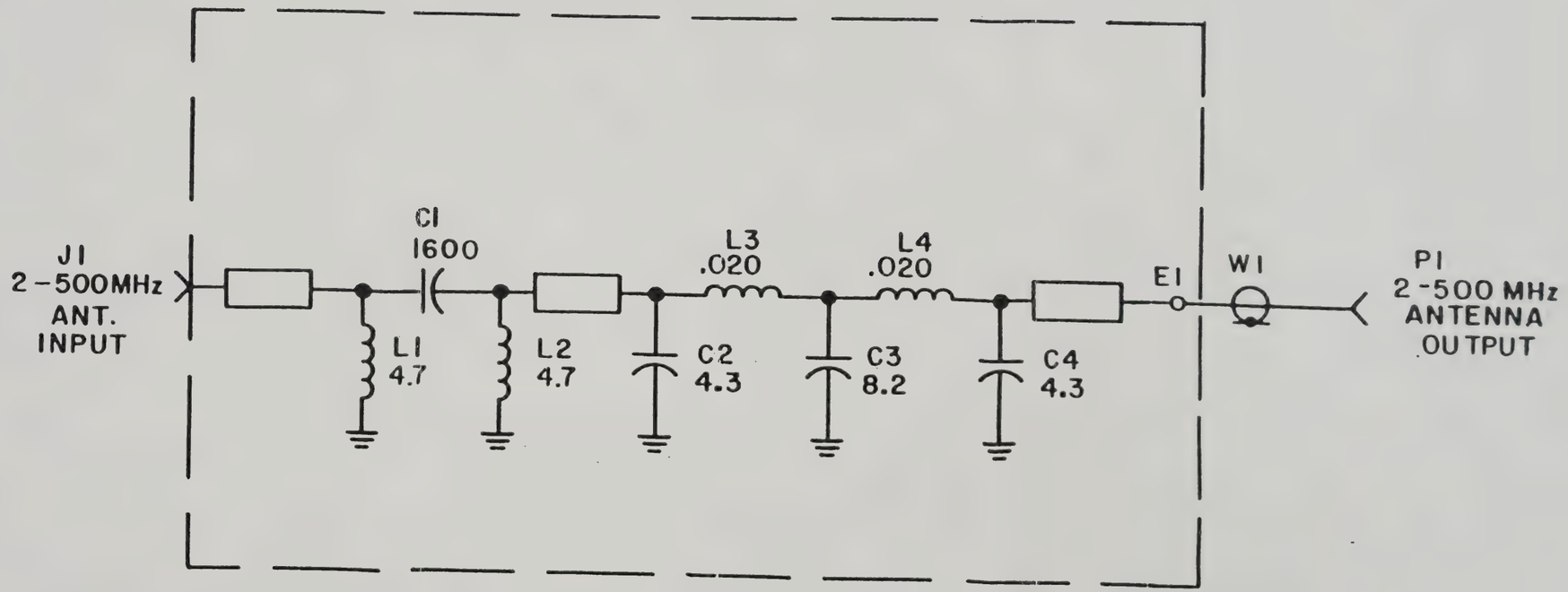

FO-H-1. Type 796291-2, RF Input Filter (A1A14), Schematic Diagram 380852

## H.9 TYPE 796291-2 RF INPUT FILTER ASSEMBLY

REF DESIG PREFIX **A1A14**

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| | Revision D1 | | | | |
| C1 | Capacitor, Ceramic, Monolithic: 16000 pF, 2%, 100 V | 1 | 200-100-NPO-162G | 51642 | |
| C2 | Capacitor, Ceramic: 4.3 pF, .5 pF, 500 V | 2 | ATC700B4R3DP500X | 29990 | |
| C3 | Capacitor, Ceramic: 8.2 pF, .25 pF, 500 V | 1 | ATC700B8R2CP500X | 29990 | |
| C4 | Same as C2 | | | | |
| J1 | Connector, Receptacle | 1 | 1009-7511-000 | 19505 | |
| L1 | Coil, Fixed: 4.7µH, 10% | 2 | 1537-28 | 99800 | |
| L2 | Same as L1 | | | | |
| L3 | Coil, Fixed | 2 | 170160-1 | 14632 | |
| L4 | Same as L3 | | | | |
| P1 | Connector, Plug | 1 | 2105-7521-005 | 19505 | |
| W1 | Cable Assembly | 1 | 280570-1 | 14632 | |

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) CAPACITANCE IS IN pF.
   b) INDUCTANCE IS IN µH.




FO-H-1. Type 796291-2, RF Input Filter (A1A14), Schematic Diagram 380852

# WJ-8615/FEX-12 RECEIVER

## APPENDIX I

## FREQUENCY EXTENDER OPTION

Copyright © BAE SYSTEMS 1990
All Rights Reserved

BAE SYSTEMS
ADVANCED SYSTEMS
700 QUINCE ORCHARD ROAD
GAITHERSBURG, MARYLAND 20878

March 2001

## PROPRIETARY STATEMENT

This document and subject matter disclosed herein are proprietary items to which BAE SYSTEMS retains the exclusive right of dissemination, reproduction, manufacture and sale.

This document is provided to the individual or using organization for their use alone in the direct support of the associated equipment unless permission for further disclosure is expressly granted in writing.

## WARRANTY

Seller warrants for a period of one year from the date of shipment, unless a different period has been agreed upon and incorporated into the Contract, that the products delivered or services rendered will conform to the specifications and be free from defects in workmanship and materials. THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF MERCHANTABILITY, FITNESS FOR PURPOSE, OR OTHER WARRANTIES OR GUARANTIES OF ANY KIND OR DESCRIPTION, WHETHER STATUTORY, EXPRESS, OR IMPLIED. If the goods delivered or services performed fail to conform to the warranty stated in this clause, Seller will correct the nonconformity at its expense by such repair, adjustment, modification, or replacement of the goods or services as Seller deems expedient. THE FOREGOING REMEDY OF BUYER FOR ANY FAILURE OF THE GOODS OR SERVICES TO MEET ANY WARRANTY IS EXCLUSIVE. BUYER EXPRESSLY AGREES THAT THE LIABILITY OF SELLER UNDER ANY WARRANTY SHALL NOT INCLUDE DAMAGE TO OUR LOSS OF PROPERTY OTHER THAN THE GOODS COVERED BY THE CONTRACT; LOSS OF PROFITS OR REVENUE; INCREASED COSTS OF ANY KIND; CLAIMS OF CUSTOMERS OF BUYER; OR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES. As to goods or components where the customer has funded the repair, Seller will warrant as limited above, the repaired portion of the unit for three months from the date of reshipment. EQUIPMENT OR PARTS DESCRIBED AS BEING MANUFACTURED BY OTHERS ARE SOLD BY SELLER AS IS and Buyer must look to the respective manufacturer for any and all claims with regard to said equipment or parts.

# TABLE OF CONTENTS

## APPENDIX I

## FREQUENCY EXTENDER OPTION


| Paragraph | | Page |
|---|---|---|
| I.1 | General Description | I-1 |
| I.1.1 | List of Parts Supplied | I-1 |
| I.2 | Installation | I-1 |
| I.3 | Operation | I-2 |
| I.4 | Circuit Description | I-2 |
| I.4.1 | Functional Description | I-2 |
| I.4.2 | Detailed Circuit Description | I-3 |
| I.4.2.1 | Type 280899-3 RF Switch Assembly (A3A2) | I-3 |
| I.4.2.2 | Type 796414-3 UHF Preselector (A3A1A1) | I-3 |
| I.4.2.3 | Type 796415-3 UHF Preamplifier/Mixer (A3A1A2) | I-4 |
| I.4.2.4 | Type 798079-2 UHF LO Synthesizer (A3A1A3) | I-6 |
| I.4.2.5 | Part 390421-1 UHF Variable Divider (A3A1A3A1) | I-6 |
| I.5 | Performance Test | I-8 |
| I.6 | Alignment | I-8 |
| I.7 | List of Manufacturers | I-9 |
| I.7.1 | Provisioning Note - Inconsistencies In Part Numbering Conventions | I-11 |
| I.8 | Replacement Parts List | I-11 |
| I.8.1 | Type 796456-4 Frequency Extender (A3) | I-14 |
| I.8.1.1 | Type 380762-1 Motherboard Assembly (A3A1) | I-16 |
| I.8.1.1.1 | Type 796414-5 UHF Preselector (A3A1A1) | I-17 |
| I.8.1.1.2 | Type 796415-3 UHF Preamplifier/Mixer (A3A1A2) | I-20 |
| I.8.1.1.3 | Type 798079-2 UHF LO Synthesizer (A3A1A3) | I-24 |
| I.8.1.1.3.1 | Type 390421-1 UHF Variable Divider (A3A1A3A1) | I-25 |
| I.8.1.1.3.2 | Type 796719-1 UHF Oscillator Assembly (A3A1A3A2) | I-28 |
| I.8.1.1.3.2.1 | Type 381473-1 UHF Oscillator PC Assembly (A3A1A3A2A1) | I-29 |
| I.8.2 | Type 280899-3 RF Switch (A3A2) | I-29 |


## LIST OF TABLES


| Table | | Page |
|---|---|---|
| I-1 | UHF Preselector Bandpass Selection Table | I-4 |
| I-2 | UHF Tuning Table | I-5 |

## TABLE OF CONTENTS (Continued)

### LIST OF ILLUSTRATIONS


| Figure | | Page |
|---|---|---|
| I-1 | WJ-8615/FEX-12 Frequency Extender | I-0 |
| I-2 | WJ-8615/FEX-12 Left Side Component View | I-12 |
| I-3 | WJ-8615/FEX-12 Right Side Component View | I-13 |
| I-4 | Type 380762-1 Motherboard (A3A1), Location of Components | I-15 |
| I-5 | Type 796414-3 UHF Preselector (A3A1A1), Location of Components | I-18 |
| I-6 | Type 796415-3 Preamplifier/Mixer (A3A1A2), Location of Components | I-21 |
| I-7 | Type 798079-2 UHF LO Synthesizer (A3A1A3), Location of Components | I-23 |
| I-8 | Type 390421-1 UHF Variable Divider (A3A1A3A1), Location of Components | I-27 |
| I-9 | Type 381473-1 UHF Oscillator PC Assembly (A3A1A3A2A1), Location of Components | I-31 |
| I-10 | Type 280899-3 RF Switch (A3A2), Location of Components | I-33 |


### FOLDOUTS


| Figure | | Page |
|---|---|---|
| FO-I-1 | Type 380762-1 Motherboard (A3A1), Schematic Diagram 480651 | FP-I-1 |
| FO-I-2 | Type 796414-5 UHF Preselector (A3A1A1), Schematic Diagram 480604 | FP-I-3 |
| FO-I-3 | Type 796415-3 UHF Preamplifier/Mixer (A3A1A2), Schematic Diagram 480592 | FP-I-5 |
| FO-I-4 | Type 798079-2 UHF LO Synthesizer (A3A1A3), Schematic Diagram 590163 | FP-I-7 |
| FO-I-5 | Type 796719-1 UHF Oscillator (A3A1A3A2), Schematic Diagram 481200 | FP-I-9 |
| FO-I-6 | Type 280899-3 RF Switch (A3A2), Schematic Diagram 480653 | FP-I-11 |
| FO-I-7 | Type 796456-4 Frequency Extender Main Chassis (A3), Schematic Diagram 481655 | FP-I-13 |

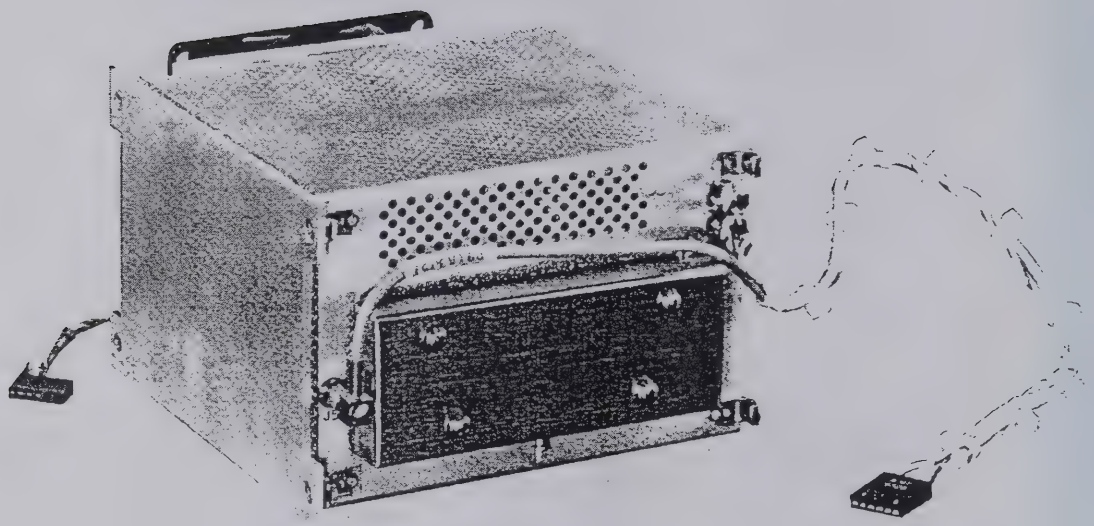


**Figure I-0. WJ-8615/FEX-12 Frequency Extender**

# APPENDIX I

# WJ-8615/FEX-12 FREQUENCY EXTENDER OPTION

## I.1 GENERAL DESCRIPTION

The WJ-8615/FEX-12 Option extends the upper tuning range of receivers in the WJ-8615 family from 500 MHz to 1200 MHz. The FEX-12 is composed of the UHF Preselector (A3A1A1) Type 796414-5, the UHF Preamplifier Mixer (A3A1A2) Type 796415-3, the UHF LO Synthesizer (A3A1A3) Type 798079-2, and the RF Switch (A3A2) Type 280899-3. When the receiver is tuned to frequencies within the extended frequency range (500-1200 MHz), the received signal is mixed with one of four fixed LO frequencies. The difference frequency (the result of down conversion) is within the VHF tuning range of the receiver.

### I.1.1 LIST OF PARTS SUPPLIED

The following items are included as part of the Frequency Extender Type 796456-2.

| Item | Ref. Designation | Type | Qty. |
|---|---|---|---|
| A3 | FE Option | 796456-4 | 1 |
| A3A1 | Motherboard | 380762-1 | 1 |
| A3A1A1 | UHF Preselector | 796414-5 | 1 |
| A3A1A2 | UHF Preamp/Mixer | 796415-3 | 1 |
| A3A1A3 | UHF LO Synthesizer | 798079-2 | 1 |
| A3A1A3A1 | UHF Var. Divider | 390421-1 | 1 |
| A3A1A3A2 | UHF Oscillator Assembly | 796719-1 | 1 |
| A3A2 | RF Switch | 280899-3 | 1 |

These items are included with the Frequency Extender. Replacement parts for these subassemblies are listed in **paragraph I.8**.

## I.2 INSTALLATION

Installation of the Frequency Extender option can be performed by following the procedure below.

**CAUTION**

When installing the Frequency Extender (FEX-12) Option, special precautions should be taken to prevent the possibility of damaging the UHF Preselector and UHF Preamp/Mixer subassemblies. Older frequency extender versions exist. Subassemblies from one version MUST NOT be mixed with the other version. Use only Type 796414-5 UHF Preselector (A3A1A1) with Type 796415-3 Preamp/Mixer (A3A1A2). Interchanging the different version types could result in physical damage to the subassemblies or cause the unit to operate out of specification.

**Installation Procedure:**

1) Remove the screws securing the rear panel and extend the rear panel.

2) Remove the middle support bracket. Carefully move the cables near the bracket to allow its removal.

3) Install the supplied support bracket and put the spacer for Aux. Connector J13 behind the connector.

4) Unlace the cable bundle, on the bottom of the unit. Remove the cable to J6 and replace it with the supplied connector cable.

5) Unlace the cable to A1A14J1. Install the fan and FE subassembly. To secure the end plate to the FE subassembly put the screws through the side of the unit far enough to hold the plate in place. Then align the screw holes in the subassembly and secure with the remaining screws.

6) Connect P1 to J1 and P7 to J7. Existing cabling may have to be carefully moved. Connect A1A14 to the FE subassembly and connect the FE output cable to A1A14.

7) Replace the wire bundles and reconnect the rear panel to the unit.

## I.3 OPERATION

Operation of the WJ-8615 receiver configured with the FEX-12 option is very similar to standard WJ-8615 operation. Installation of the option allows the extended frequency range to be tuned directly from the front panel or remotely via the FRQ mnemonic.

## I.4 CIRCUIT DESCRIPTION

### I.4.1 FUNCTIONAL DESCRIPTION

With the FEX-12 Option installed, the 20-500 MHz output from the RF Switch (A3A2) is applied to a VHF/UHF select switch in the Type 796415-3 UHF Preamplifier/Mixer (A3A1A2), and the 500-1200 MHz RF Switch output is applied to the input of the UHF Preselector (A3A1A1) Type 796414-5. Refer to **Foldout FO-I-6** for the WJ-8615 Frequency Extender Main Chassis schematic diagram.

When the receiver is tuned to frequencies above 500 MHz, the incoming signals are applied from the 500-1200 MHz output of the RF Switch to the input of the UHF Preselector (A3A1A1). The UHF Preselector divides the 500 to 1200 MHz RF frequency range into 4 bands (500 to 599, 600 to 699, 700 to 899 and 900-1200 MHz). Switching between bands is accomplished via the PIN diode switching network, which applies the signal through the selected bandpass filter, determined by the tuned frequency of the receiver. The

control signals from the UHF LO Synthesizer (A3A1A3) provide bias current to the PIN diode switching network to accomplish switching between the preselector bands as the UHF LO Synthesizer is tuned.

From the UHF Preselector, the RF signal is applied to the UHF Preamplifier/Mixer (A3A1A2), where the signal is amplified and mixed with the LO signal provided by the UHF LO Synthesizer (A3A1A3) producing an output frequency within the VHF frequency range. A voltage controlled attenuator (U2) within UHF Preamplifier/Mixer provides automatic gain control (AGC) for this subassembly. U2 receives a dc bias voltage from the AGC circuitry of the receiver which varies with respect to the strength of the received signal, thus controlling the overall gain of the FEX-12 Option. The amount of attenuation introduced by U2 varies directly with the strength of the tuned signal providing a relatively constant signal to the mixer (U3). From the mixer, the down converted signal is applied to the receiver via the UHF/VHF select switch in the output circuitry of the UHF Preamplifier/Mixer.

When the receiver is tuned to 500 MHz or less, the UHF/VHF switch, at the output of the UHF Preamplifier, switches to provide a signal path from the 20-500 MHz RF Switch output to the VHF section of the receiver. At this time, the output from the UHF section is cut off.

## I.4.2 DETAILED CIRCUIT DESCRIPTION

### I.4.2.1 Type 280899-3 Switch Assembly (A3A2)

The reference designation for this subassembly is A3A2. Refer to **Foldout FO-I-5** for the Type 280899-3 RF Switch schematic diagram.

RF Switch (A3A2) Type 280899-1 receives input RF signals from the Antenna Input (J1). Received RF signals are capacitively coupled through C7 and C9 to the two filter branches. One branch, consisting of L6 and L7, C10 through C15 and their associated components, forms the VHF (500-1200 MHz) bandpass filter. Filter branch selection is accomplished via voltages from the Motherboard (A3A1) applied to E1 and E2 of the RF Switch Assembly. When the receiver tuned frequencies are from 20 to 500 MHz, a +15 Vdc is applied to E1 of the RF switch. At the same time a -10 Vdc is applied to E2. Applying a +15 Vdc to E1, of the RF Switch (A3A2), forward biases CR3 and allows the received RF signal to flow through the VHF filter branch and to J2 of the UHF Preamplifier/Mixer (A3A1A2). While the +15 Vdc is applied to E1 a -10 Vdc is applied to E2. This -10 Vdc reverse biases CR4 and prohibits signal flow through the UHF bandpass filter branch. Tuning the receiver to frequencies from 500-1200 MHz causes the voltages applied to E1 and E2 to be reversed. The -10 Vdc on E1 inhibits the flow of signals through the VHF branch by reverse biasing CR3. The +15 Vdc applied to E2 forward biases CR4 and permits UHF signals to be passed through the UHF bandpass filter branch.

### I.4.2.2 Type 796414-5 UHF Preselector (A3A1A1)

The reference designation for this subassembly is A3A1A1. Refer to **Foldout FO-I-1** for the Type 796414-5 UHF Preselector schematic diagram.

The Type 796414-5 UHF Preselector (A3A1A1) provides the first stage of RF preselection for the 500-1200 MHz UHF signals. This subassembly utilizes three bandpass filters (FL1 through FL3) dividing the UHF spectrum into three bands: 500-700, 700-900 and 900-1200 MHz. Each bandpass filter is essentially

flat over its specified frequency and passes these frequencies with minimum attenuation (0.5 dB). Frequencies out of the filter bandpass are attenuated, thus improving image frequency and IF rejection. The RF signal enters the UHF preselector via P1 of cable W1 and is coupled by C1 to the PIN diode switching network comprised of CR1 through CR14. This switching network applies the signal of interest through the appropriate bandpass filter, according to the tuned frequency of the receiver. From the filter, the RF signal is coupled through C12 to the output (P2 of W2).

Switching of the RF signal through the proper filter is controlled by the Band A*, B* and C* select inputs. Dependent upon the tuned frequency, the Band A*, B*, or C* select is placed at -10 Vdc providing a current-sink through its respective series input and output PIN diodes. When conducting, the diodes provide a minimum impedance path for the RF signal through the filter within the selected branch. The remaining select inputs are held at +15 Vdc which provides a current source for the shunt diodes in their switch branch. The series diodes in these branches are cut off, thus blocking the RF signal path. The select inputs required to activate each filter branch are illustrated in the UHF Preselector Bandpass Selection Table (**Table I-1**). Each of the select inputs are provided by the Digital Control Section, automatically selecting the proper filter for the frequency tuned.

**Table I-1. UHF Preselector Bandpass Selection Table**

| Select UHF/VHF | C* | B* | A* | Active Filter | Bandpass (MHz) |
|---|---|---|---|---|---|
| 0 | 1 | 1 | 1 | --- | --- |
| 1 | 1 | 1 | 0 | FL1 | 500 - 700 |
| 1 | 1 | 0 | 1 | FL2 | 700 - 900 |
| 1 | 0 | 1 | 1 | FL3 | 900 - 1200 |

0 = -10 Vdc
1 = +5 Vdc

Inductors L1 through L8, ferrite beads FB3 through FB12, resistors R1, R3 through R9 and capacitors C6 through C11 and C13 through C18 function as decoupling components. These components prevent RF signals from exiting the UHF Preselector via the select inputs of the subassembly.

### I.4.2.3 Type 796415-3 UHF Preamplifier/Mixer (A3A1A2)

The reference designation for this subassembly is A3A1A2. Refer to **Foldout FO-I-2** for the Type 796415-3 UHF Preamplifier/Mixer schematic diagram.

The RF signal from the Type 796414-3 UHF Preselector (A3A1A1) enters the UHF Preamplifier/Mixer (A3A1A2) via RF input connector J1 and is applied to the input of preamplifier U1. U1, a broadband amplifier, provides +15.5 dB of gain to the RF signal increasing the signal to a sufficient level to drive the mixer. Decoupling of the +15 Vdc input to U1 (pin 1) is accomplished by L3 and C5. The output of U1 (pin 4) is then applied to PIN diode attenuator U2 via FL1. FL1 is a 1200 MHz low-pass filter, installed in the signal path to attenuate frequencies

* Indicates active low.

above 1200 MHz, thus reducing image noise from U1. Voltage controlled attenuator U2, presents a constant impedance at the output of FL1 and provides a means of limiting the signal level to the mixer under strong signal conditions. The amount of attenuation presented by U2 is dependent on the AGC voltage provided by the AGC circuitry of the receiver applied to terminal 49 of the UHF Preamplifier/Mixer subassembly. This voltage varies from +10 Vdc, when weak signals are present to +2 Vdc under strong signal conditions. The attenuation presented by U2 varies between -20 dB, with an AGC voltage of +2 Vdc, to -1.75 dB, with an AGC voltage of +10 Vdc. Operating bias is supplied by +15 Vdc applied to pin 1 via the decoupling network comprised of L4 and C6. Control is supplied by the AGC voltage applied to pin 5. L9, C16 and C17 provide decoupling of the AGC input line.

Double balanced mixer U3 receives the RF signal from U2 and mixes it with an LO signal provided by the UHF LO Synthesizer (A3A1A3) providing a difference frequency within the VHF range. The UHF LO Synthesizer applies one of four different fixed frequencies to the mixer to divide the UHF frequency range into four frequency bands as illustrated in the UHF Tuning Table (**Table I-2**). The Digital Control Section then tunes the VHF section of the receiver to the mixer output frequency, thus permitting the signal of interest to be further processed. The mixer output from pin 1 of U3 is coupled across dc blocking capacitor C22 and is then applied through a low-pass filter comprised of L10, C26 and C27. This filter suppresses high order harmonics of the UHF LO preventing their radiation from the VHF input (J2). From the low-pass filter, the RF signal is applied to the UHF branch of the UHF/VHF switch.

**Table I-2. UHF Tuning Table**

| RF Tuned Frequency (MHz) | LO Frequency (MHz) | FE Output Frequency (MHz) | FE Output Equation |
|---|---|---|---|
| 500 - 599 | 848 | 348 - 249 | = 848 – Tuned Frequency |
| 600 - 699 | 944 | 344 - 245 | = 944 – Tuned Frequency |
| 700 - 899 | 1144 | 444 - 245 | = 144 – Tuned Frequency |
| 900 - 1200 | 1344 | 444 - 144 | = 1344 – Tuned Frequency |
| <500 | N/A | N/A | = Tuned Frequency |

The UHF/VHF switch, comprised of CR3 through CR6, selects the converted UHF signal from the UHF mixer or the VHF signal from the RF Switch (A3A2), entering at J2. Switching is controlled by the UHF/VHF input (terminal 53) provided by the Digital Control Section. This switching input is at a logic "1" (+5 Vdc) when the receiver is tuned to 500 MHz or above and at a logic "0" (0 Vdc) when tuned below 500 MHz. The UHF/VHF select signal from terminal 53 is applied, via R11, to the inverting input of switch driver U8B and also to the U8A non-inverting input. These switch drivers switch between +15 Vdc and -10 Vdc providing bias current for the PIN diodes in the UHF/VHF switch. With a tuned frequency of 500 MHz or higher, the +5 Vdc level causes the output of U8A to switch to +15 Vdc. This provides a current source for CR4, causing it to conduct and provides a current path for the converted UHF signal to the output of the subassembly (J4). At this time the output of U8B is at -10 Vdc, providing a current-sink for CR6. This causes CR6 to conduct and series diode CR5 to be cut off, preventing the VHF signal from passing through the switch. With tuned frequencies below 500 MHz, the outputs of U8A and U8B are reversed, causing a signal path for the VHF signal through CR5 and blocking the UHF path by cutting off CR4. The voltage divider formed by R5 and R3 provides a switching reference level of approximately 1.5 Vdc.

Integrated circuits U6 and U7 function as switch drivers for the band select circuitry of the UHF Preselector (A3A1A1). These switch drivers receive the UHF/VHF and the 20 and 21 UHF select inputs from the Digital Control Section and decode these inputs to select the proper preselector filter as the UHF LO Synthesizer is tuned. The UHF select inputs are applied to the A, B and C inputs of decoder U4, which in turn provides a logic "1" level to the inverting input of appropriate switch driver (U7B, U6A or U6B). The UHF/VHF input is also applied directly to the non-inverting input of U7A causing the output of U7A to be held at +5 Vdc, whenever UHF is selected by the UHF/VHF select input. The remaining drivers switch according to the logic levels provided at the 20 and 21 UHF select inputs.

When the receiver is tuned between 500 and 599 MHz, 20 and 21 are both at a logic "0", causing the Q4 output of U4 to be placed at a logic "1." This level is applied at pin 6 of U6B, via CR2, causing the A* select output to be switched to -15 Vdc. At frequencies of 500 to 699 MHz, 20 is at logic "1" and 21 is at logic "0." This condition causes the Q5 output of U4 to be placed at a logic "1" level. This level is applied at pin 6 of U6B, via CR1, causing the A* select output to be switched to -15 Vdc. At tuned frequencies of 700 to 899 MHz, 20 is at a logic "0" and 21 is at a logic "1", causing the Q6 output of U4 to be placed at a logic "1." The Q6 output level is applied to the inverting input of U6A, causing the B* output to be switched to -15 Vdc. When frequencies between 900 and 1200 MHz are tuned, both the 20 and 21 select inputs are at a logic "1" state. This causes the Q7 output of U4 to be placed at a logic "1" state. The Q7 output is applied to the inverting input of U7B, causing the C* output to be switched to -15 Vdc.

The LO signal provided by the UHF LO Synthesizer is applied to the mixer (U3) via J3 and buffer amplifier U5. U5 receives the LO signal at a level of -3 dBm and provides amplification of +10 dB increasing the signal to a sufficient level to drive mixer U3. L5 and C7 function as decoupling components maintaining a signal ground potential on the +9 Vdc source.

### I.4.2.4 Type 798079-2 UHF LO Synthesizer (A3A1A3)

The reference designation for this subassembly is A3A1A3. Refer to **Foldout FO-I-3** for the Type 798079-2 UHF LO Synthesizer schematic diagram.

This subassembly consists of the UHF Variable Divider (A3A1A3A1) and the UHF Oscillator Assembly (A3A1A3A2), which together comprise the phase locked loop of the UHF LO Synthesizer. The inputs consists of the 1 MHz reference, (provided by the Synthesizer Section at J2) the UHF and UHF SEL (21, 20) select inputs provided by the Digital Control Section. The output provided consists of a fixed LO frequency of 848, 944, 1144 or 1344 MHz at J1 of the 848-1344 MHz Oscillator.

### I.4.2.5 Part 390421-1 HF Variable Divider (A3A1A3A1)

The reference designation for this part is A3A1A3A1. Refer to **Foldout FO-I-3** for the Part 390421-1 schematic diagram.

The Part 390421-1 UHF Variable Divider (A3A1A3A1) provides the tuning control for the 848-1344 MHz Oscillator, A3A1A3A2. This subassembly decodes the UHF, 20 and 21 select lines, provided by the Digital Control Section, and utilizes the decoded data to select the oscillator frequency band and to preset the divide-by-n counters in the phase-locked-loop circuitry.

Control inputs to the Part 390421-1 UHF Variable Divider consist of the UHF, 20, and 21 select inputs, provided at terminals E1, E2 and E3. The UHF input line, which is set to a logic "1" whenever the receiver is tuned above 500 MHz, is applied to the G input of U8 and to the cathode of CR1 enabling the Variable Divider circuitry. The 20 and 21 inputs are applied to the A and B inputs of U8 and to gates A and B of U9. U8 and U9 then decode the select inputs selecting the oscillator frequency band and presetting binary counters U7 and U6. Comparator U5 monitors the output lines of U8 and compares the logic level at each line with a +2.5 Vdc reference, provided by the voltage divider formed by R1 and R2. Each comparator in U5 provides +15 Vdc to the appropriate band select input of the oscillator assembly when its respective input (from U8) goes low, causing the desired oscillator band to be selected. The remaining outputs of U5 are held at -15 Vdc, due to the logic "1" at their inverting inputs.

A sample of the output frequency of A3A1A3U1 enters the Variable Divider at E9 and is applied to the input of amplifier U4 via the pad formed by R9, R10 and R11. U4 amplifies the oscillator frequency and applies the signal to the input of U3, via C12. Integrated circuits U3 and U2 provide divide factors of 4 and 2, respectively, providing a total prescaling factor of 8. The prescaled output is then applied to the input of a two modulus counter which further divides the signal by a factor of 10 or 11, as determined by the CRY output of counter U6. When the CRY output is at a logic "0," U1 divides by 11 and when the output is at a logic "1," U1 divides by 10. The output of U1 is then applied as a TTL clock to counters U7 and U6.

Presetable binary counters U7 and U6 function with the two modulus counter U1 providing division factors of 106, 118, 143 or 168. U7 and U6 are preset by the decoded outputs of U8 and U9 and count up from the preset until the maximum count is reached. When the maximum count is reached, a pulse is provided to the phase detector U10 and the CRY output of U7 reloads the counters, restarting the count sequence. U7 determines the total number of counts in each count sequence and U6 determines the number of times U1 divides by 11 or 10.

For example, when a LO frequency of 848 MHz is selected, U7 is preset to "6" and U6 is preset to "9." The total count sequence continues until U7 counts up from "6" to its maximum of "15" and then resets (10 counts). Simultaneous with the count of U7, U6 counts up from its preset of "9" to its maximum of "15" (6 counts). When U6 reaches "15" the CRY output is set to 1 and U6 counting halts until the preset is reloaded. During the first 6 counts (while U6 is counting) U1 divides by a factor of 11. For the remaining 4 counts (until U7 reaches its maximum count) U1 divides by a factor of 10. The total count sequence provides a divide factor of 106 (11x6) + (10x4). This, combined with the division factor of 8 by the prescaler, divides the oscillator output frequency by a factor of 848.

The output of U7 is applied to the phase detector (U10), where the divided signal is compared with the 1 MHz reference signal, provided by the Synthesizer Section of the receiver. The phase detector compares the frequency and phase of the two signals and generates an output representing the difference between the signals. This output is integrated by the loop filter, comprised of Q1, Q2 and associated components, to produce a tuning voltage which retunes the oscillator until the divided signal and the reference signal are equal in both frequency and phase. R18 and C22 determine the bandwidth of the loop filter, and C21 and R19 permit bandwidth adjustment.

## I.5 PERFORMANCE TEST

After the Frequency Extender Option has been installed, verify proper operation of the frequency extender via the following procedure.

1. Connect a signal generator to the Antenna Input (J1) with a CW output at -20 dBm. Connect a spectrum analyzer to J4 of the Frequency Extender.

2. Tune the signal generator and the receiver to 500 MHz. Set the spectrum analyzer center frequency to 348 MHz. Note the output level displayed on the spectrum analyzer.

3. Tune the receiver and signal generator to the following frequencies and monitor the output frequency and level on the spectrum analyzer. Verify the frequency accuracy (1 kHz) and the output level gain (+3 to +6 dB gain), compared to the level noted in step 2.

| Tuned Frequency | S.A. Frequency |
|---|---|
| 599 MHz | 249 MHz |
| 600 MHz | 344 MHz |
| 699 MHz | 245 MHz |
| 700 MHz | 444 MHz |
| 899 MHz | 245 MHz |
| 900 MHz | 444 MHz |
| 1200 MHz | 144 MHz |

## I.6 ALIGNMENT

Alignment of the Frequency Extender Option may be performed via the procedure that follows:

1. Using an RF analyzer, connect the RF analyzer reflection test port to the Antenna Input (J1) and the RF analyzer's transmission RF input to J3 of the RF Switch (A3A2). Tune the WJ-8615 to 600 MHz.

2. Observe the displayed response on the RF analyzer. Adjust the analyzer to display a 500 MHz response centered at 450 MHz.

3. Adjust L7 to notch out the frequency at 228 MHz and L6 to notch out the frequency at 337 MHz. (Coil adjustment is accomplished via compressing or spreading the coil turns.)

4. Verify that the roll off from 450 MHz to 350 MHz is a minimum of 30 dB and that the ripple from 200 MHz to 340 MHz is at least 30 dB below the level at 450 MHz.

5. Verify the insertion loss is not greater than 1.5 dB and that the bandpass ripple is not more than 1.75 dB overall.

6. With the RF analyzer transmission RF input connected to A3A2J2, connect the reflection test port to the Antenna Input (J1), tune the WJ-8615 to 400 MHz and observe the displayed response.

7. Adjust L8 and L9 to produce minimum insertion loss and maximum flatness (less than 0.5 dB loss from 400 MHz to 550 MHz).

## I.7 LIST OF MANUFACTURERS

| Mfr. Code | Name and Address |
|---|---|
| 00779 | Amp, Inc.<br>P.O. Box 3608<br>Harrisburg, PA 17105 |
| 01295 | Texas Instruments, Inc.<br>Semiconductor-Components Div.<br>13500 North Central Expressway<br>Dallas, TX 75231 |
| 02114 | Ferroxcube Corp.<br>P.O. Box 359<br>Mount Marion Road<br>Saugerties, NY 12477 |
| 02735 | RCA Corporation<br>Solid State Division<br>Route 202<br>Somerville, NJ 08876 |
| 04222 | AVX Ceramics<br>Division of AVX Corp.<br>Myrtle Beach, SC 29577 |
| 04713 | Motorola, Inc.<br>Semiconductor Products Div.<br>Phoenix, AZ 85008 |
| 05397 | Union Carbide Corp.<br>11901 Madison Avenue<br>Cleveland, OH 44101 |
| 09021 | Airco Electronics<br>Bradford, PA 16701 |
| 14482 | Watkins-Johnson Company<br>3333 Hillview Avenue<br>Palo Alto, CA 94304 |
| 14632 | BAE SYSTEMS<br>Advanced Systems<br>700 Quince Orchard Road<br>Gaithersburg, MD 20878 |
| 18736 | Voltronics Corporation<br>West Street<br>Hanover, NJ 07936 |
| 19505 | Applied Engineering Products<br>300 Seymour Avenue<br>Derby, CT 06418 |
| 24539 | Avantek, Incorporated<br>3175 Bowers Avenue<br>Santa Clara, CA 95051 |
| 24546 | Corning Glassworks<br>Bradford, PA 16701 |

| Mfr. Code | Name and Address |
|---|---|
| 27014 | National Semi-Conductor Corp.<br>2950 San Ysidro Way<br>Santa Clara, CA 95051 |
| 28480 | Hewlett-Packard Company<br>1501 Page Mill Road<br>Palo Alto, CA 94304 |
| 29990 | American Technical Ceramics<br>1 Norden Lane<br>Huntington Station, NY 11746 |
| 31433 | Union Carbide Corporation<br>P.O. Box 5928<br>Greenville, SC 29606 |
| 33095 | Spectrum Control, Inc.<br>152 East Main Street<br>Fairview, PA 16415 |
| 34731 | Lakeside Bridge and Steel Co.<br>5303 North 33rd Street<br>Milwaukee, WI 53209 |
| 50101 | Frequency Sources, Inc.<br>16 Maple Road<br>South Chelmsford, MA 01824 |
| 50140 | K and L Microwave, Inc.<br>203 Newton Street<br>Salisbury, MD 21801 |
| 51642 | Centre Engineering, Inc.<br>State College, PA 16801 |
| 52648 | Plessey Semiconductors<br>1641 Kaiser<br>Irvine, CA 92714 |
| 55969 | Metuchen Capacitors, Inc.<br>420 Park Avenue<br>Perth Amboy, NJ 08861 |
| 56289 | Sprague Electric Company<br>Marshall Street<br>North Adams, MA 01247 |
| 57856 | Aero American, Incorporated<br>7830 Balboa Boulevard<br>Van Nuys, CA 91406 |
| 59660 | Tusonix, Incorporated<br>2155 N. Forbes Blvd., Suite 107<br>Tucson, AZ 85745 |
| 71279 | Midland-Ross Corporation<br>Cambridge, MA 02140 |
| 73138 | Beckman Instruments, Inc.<br>2500 Harbor Boulevard<br>Fullerton, CA 92634 |
| 75037 | Minnesota Mining & Manuf. Co.<br>3 M Center<br>St. Paul, MN 55101 |
| 76055 | Mallory Control Division<br>P.O. Box 327<br>State Road 28W<br>Frankfort, IN 46041 |
| 80131 | Electronics Industries Assoc.<br>2001 Eye Street, N.W.<br>Washington, D.C. 20006 |
| 81312 | Winchester Electronics<br>Division Litton Industries<br>Main Street and Hillside Avenue<br>Oakville, CT 06779 |
| 81349 | Military Specifications |
| 91293 | Johanson Mfg. Co.<br>Boonton, NJ 07005 |

| Mfr. Code | Name and Address |
|---|---|
| 91506 | Augat, Incorporated<br>33 Perry Avenue<br>Attleboro, MA 02703 |
| 91984 | Maida Development Co.<br>Hampton, VA 23663 |
| 96341 | Microwave Assoc., Inc.<br>South Avenue<br>Burlington, MA 01803 |
| 98291 | Sealectro Corporation<br>225 Hoyt<br>Mamaroneck, NY 10544 |
| 99800 | American Precision Industries<br>Delevan Electronics Division<br>270 Quaker Road<br>East Aurora, NY 14052 |

## I.7.1 PROVISIONING NOTE - INCONSISTENCIES IN PART NUMBERING CONVENTIONS

The internal computer applications at BAE SYSTEMS Gaithersburg Operations have undergone upgrades to better serve our customers. With this upgrade came alterations to the numbering scheme for parts reporting to an end item. Due to these alterations, minor inconsistencies may exist between identifying parts numbers found on drawings, piece parts, or other documentation. No form fit and function specifications have been altered due to this change in the numbering scheme.

The inconsistencies take two forms. New part number conventions mandate the use of three-digit suffixes for part numbers used within computer applications. Part numbers having single-digit suffixes have been altered by the addition of leading zeroes. Therefore, a piece part with an identifying number having a suffix of "-2" may be represented in a computer-generated document with a part number having a suffix of "-002". Also the new part numbering convention requires that the base portion of a part number be made up of six digits. Part numbers with base portions with less than six digits are expressed with leading zeroes to meet this requirement. Accordingly, a part number having a base of "34456" may appear as "034456". If you have questions or concerns regarding the configuration identification of piece parts, contact the plant for additional information at 1-800-954-3577.

## I.8 REPLACEMENT PARTS LIST

The following parts list contains all the electrical components and certain mechanical parts, subject to unusual wear or possible damage, used in the Frequency Extender Option. The List of Manufacturers provided in **paragraph I.7**, and the manufacturer's component part numbers are included as an aid for the equipment user in the field. The listed parts may not necessarily agree with the components installed; however, the listed parts can be used and will provide satisfactory equipment operation. Replacement parts may be obtained from any manufacturer, as long as the physical and electrical parameters of the replacement part agree with the original part.

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| I.8.1.1 | **Type 380762-1 Motherboard Assembly** | | | REF DESIG PREFIX **A3A1** | |
| | Revision B1 | | | | |
| C1 | Capacitor, Ceramic, Disc: 0.1µF, 20%, 50 V | 3 | 34475-1 | 14632 | |
| C2 | Same as C1 | | | | |
| C3 | Same as C1 | | | | |
| C4 | Capacitor, Ceramic, Disc: 0.47µF, 20%, 50 V | 1 | 34452-1 | 14632 | |
| C5 | Capacitor, Electrolytic, Tantalum: 100µF, 20%, 35 V | 2 | MTP107M035P1C | 76055 | |
| C6 | Same as C5 | | | | |
| C7 | Capacitor, Ceramic, Disc: .01µF, 20%, 50 V | 6 | 34453-1 | 14632 | |
| C8 Thru C12 | Same as C7 | | | | |
| CR1 | Diode | 2 | 1N4446 | 80131 | |
| CR2 | Same as CR1 | | | | |
| J1 | Socket, Integrated Circuit | 1 | 514-AG10D | 91506 | |
| L1 | Coil, Fixed: 0.47µH | 1 | 1025-12 | 99800 | |
| P1 | Connector, Plug | 1 | 3406-0002 | 75037 | |
| R1 | Resistor, Fixed, Film: 1.0 kΩ, 5%, 1/8 W | 1 | CF1/8-1.0K/J | 09021 | |
| R2 | Resistor, Fixed, Film: 5.1 kΩ, 5%, 1/8 W | 1 | CF1/8-5.1K/J | 09021 | |
| R3 | Resistor, Fixed, Film: 180Ω 5%, 1/8 W | 1 | CF1/8-180 OHMS/J | 09021 | |
| R4 | Resistor, Fixed, Film: 7.5Ω, 5%, 1/4W | 1 | CF1/4-7.5 OHMS/J | 09021 | |
| U1 | Integrated Circuit | 1 | LM358N | 27014 | |
| W1 | Cable Assembly | 1 | 380532-1 | 14632 | |
| XA1 | Housing | 2 | MK30C-13-195-4381 | 81312 | |
| XA2 | Same as XA1 | | | | |
| XA3 | Connector, Receptacle, Multipin | 1 | RF30-2852-5 | 57856 | |

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| I.8.1.1.1 | **Type 796414-5 UHF Preselector** | | | REF DESIG PREFIX **A3A1A1** | |
| | Revision A | | | | |
| C1 | Capacitor, Ceramic, Chip: 470 pF, 10%, 100 V | 2 | C1210C471K1GAC | 31433 | |
| C2 Thru C5 | Not Used | | | | |
| C6 | Capacitor, Ceramic, Monolithic: 220 pF, 5%, 100 V | 6 | 8121-100-C0G0-221J | 59660 | |
| C7 Thru C11 | Same as C6 | | | | |
| C12 | Same as C1 | | | | |
| C13 | Capacitor, Ceramic, Disc: 0.1µF, 20%, 50 V | 3 | 34475-1 | 14632 | |
| C14 | Capacitor, Ceramic, Disc: 1000 pF, 500 V | 3 | 59Z5U102P | 91984 | |
| C15 | Same as C13 | | | | |
| C16 | Same as C14 | | | | |
| C17 | Same as C13 | | | | |
| C18 | Same as C14 | | | | |
| C19 | Capacitor, Variable, Air: 1-4.5 pF, 250 V | 2 | 9410-0 | 91293 | |
| C20 | Same as C19 | | | | |
| CR1 | Diode Pin | 14 | 841320 | 14632 | |
| CR2 Thru CR9 | Same as CR1 | | | | |
| CR10 | Diode | 2 | MA47201 | 96341 | |
| CR11 | Same as CR10 | | | | |
| CR12 Thru CR14 | Same as CR1 | | | | |
| E3 | Terminal/Forked | 8 | 140-1941-02-01 | 71279 | |
| E4 Thru E8 | Same as E3 | | | | |
| E9 Thru E10 | Not Used | | | | |
| E11 Thru E12 | Same as E3 | | | | |
| FB1 | Not Used | | | | |
| FB2 | Not Used | | | | |
| FB3 | Ferrite Bead | 10 | 56-590-65-4A | 02114 | |
| FB4 Thru FB12 | Same as FB3 | | | | |
| FL1 | Filter, Bandpass: 600 MHz CF, 200 MHz Bandwidth | 1 | 92222 | 14632 | |
| FL2 | Filter, Bandpass: 800 MHz CF, 200 MHz Bandwidth | 1 | 92223 | 14632 | |
| FL3 | Filter, Bandpass: 1050 MHz CF | 1 | 92390 | 14632 | |

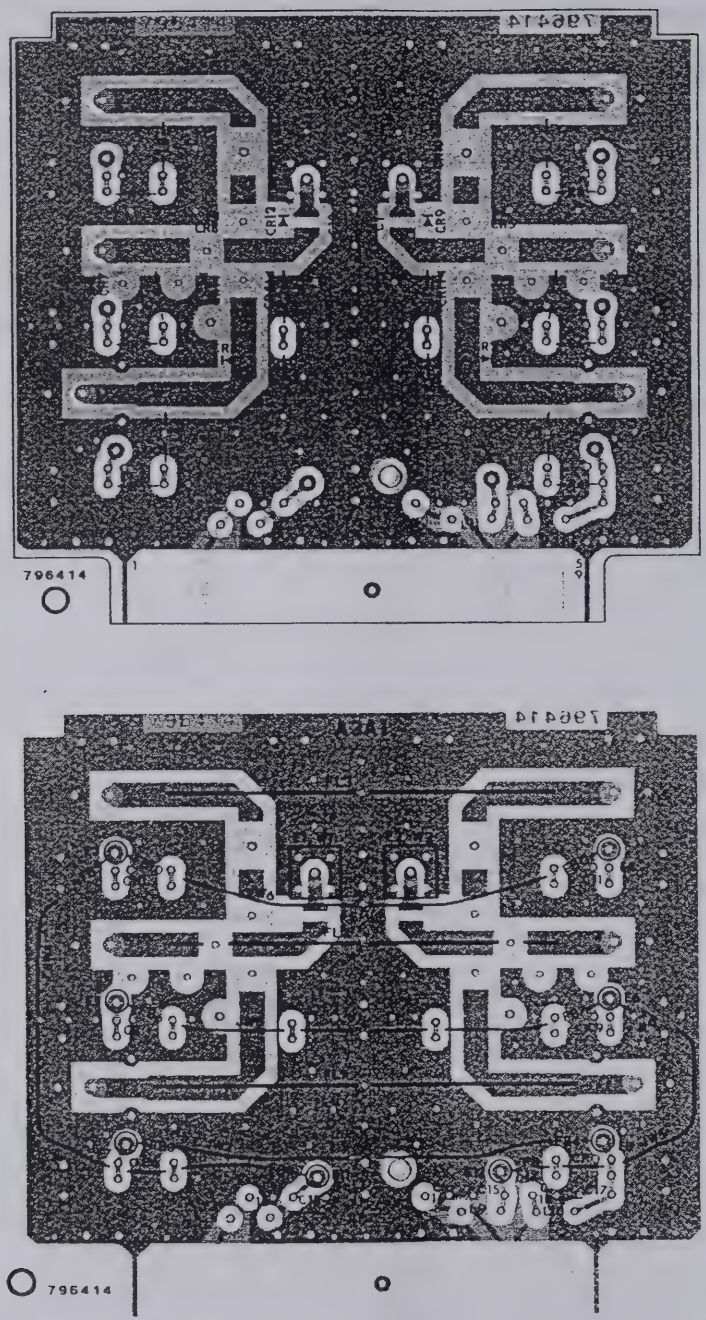



**Figure I-5. Type 796414-5, UHF Preselector (A3A1A1), Location of Components**

REF DESIG PREFIX **A3A1A1**

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| L1 | Coil, Fixed | 8 | 170134-1 | 14632 | |
| L2 Thru L8 | Same as L1 | | | | |
| L9 | Coil, Fixed | 3 | 190187-1 | 14632 | |
| L10 | Same as L9 | | | | |
| L11 | Same as L9 | | | | |
| P1 | Connector, Plug | 1 | 50-024-3875-91 | 98291 | |
| P2 | Connector, Plug | 1 | 50-328-3875-91 | 98291 | |
| R1 | Resistor, Fixed, Film: 1.2 kΩ, 5%, 1/4 W | 2 | CF1/4-1.2K/J | 09021 | |
| R2 | Not Used | | | | |
| R3 | Same as R1 | | | | |
| R4 R5 Thru R9 | Resistor, Fixed, Composition: 470Ω, 5%, 1/8 W | 6 | RCR05G471JS | 81349 | |
| W1 | Cable Assembly | 1 | 17300-188-3 | 14632 | |
| W2 | Cable Assembly | 1 | 17300-188-4 | 14632 | |

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|

## I.8.1.1.2 Type 796415-3 UHF Preamplifier/Mixer — REF DESIG PREFIX A3A1A2

| | | | | | |
|---|---|---|---|---|---|
| | Revision A | | | | |
| C1 | Capacitor, Electrolytic, Tantalum: 4.7µF, 20%, 35 V | 2 | 196D475X0035JE3 | 56289 | |
| C2 | Capacitor, Ceramic, Disc: 0.1µF, 20%, 50 V | 15 | 34475-1 | 14632 | |
| C3 | Same as C1 | | | | |
| C4 | | | | | |
| Thru | Same as C2 | | | | |
| C15 | | | | | |
| C16 | Capacitor, Ceramic, Monolithic: 470 pF, 5%, 100 V | 3 | 8121-100-C0G0-471J | 59660 | |
| C17 | Same as C16 | | | | |
| C18 | Same as C2 | | | | |
| C19 | Same as C2 | | | | |
| C20 | Capacitor, Ceramic, Disc: 1000 pF, 10%, 100 V | 2 | 8121-100-X7R0-102K | 59660 | |
| C21 | Same as C20 | | | | |
| C22 | Capacitor, Ceramic, Chip: 220 pF, 10%, 50 V | 1 | C1210C221K5GAH | 05397 | |
| C23 | Capacitor, Ceramic, Chip: .05µF, 10%, 50 V | 2 | 1210-050-X7R-503K5 | 55969 | |
| C24 | Same as C23 | | | | |
| C25 | Same as C16 | | | | |
| C26 | Capacitor, Ceramic, Chip: 4.3 pF, 0.5%, 500 V | 2 | ATC700B4R3DP500X | 29990 | |
| C27 | Same as C26 | | | | |
| C28 | Capacitor, Ceramic, Chip: 470 pF, 10%, 100 V | 1 | C1210E471K1GAH | 31433 | |
| C29 | Capacitor, Variable, Air: 0.6-4.5 pF, 500 V | 1 | M5F | 18736 | |
| CR1 | Diode | 2 | 1N4446 | 80131 | |
| CR2 | Same as CR1 | | | | |
| CR3 | Diode, Pin | 2 | GC4212-15 | 50101 | |
| CR4 | Diode, Pin | 2 | GC4371-15 | 50101 | |
| CR5 | Same as CR4 | | | | |
| CR6 | Diode | 1 | 5082-3040 | 28480 | |
| CR7 | Not Used | | | | |
| CR8 | Same as CR3 | | | | |
| FL1 | Filter Low-Pass: 400-1200 MHz | 1 | 92389 | 14632 | |
| J1 | Connector, Receptacle | 4 | 1009-7511-000 | 19505 | |
| J2 | | | | | |
| Thru | Same as J1 | | | | |
| J4 | | | | | |
| L1 | Coil, Fixed | 6 | 16209-12 | 14632 | |
| L2 | | | | | |
| Thru | Same as L1 | | | | |
| L5 | | | | | |
| L6 | Coil, Fixed | 2 | 170134-1 | 14632 | |
| L7 | Coil, Fixed | 2 | 190187-1 | 14632 | |
| L8 | Same as L6 | | | | |
| L9 | Same as L1 | | | | |

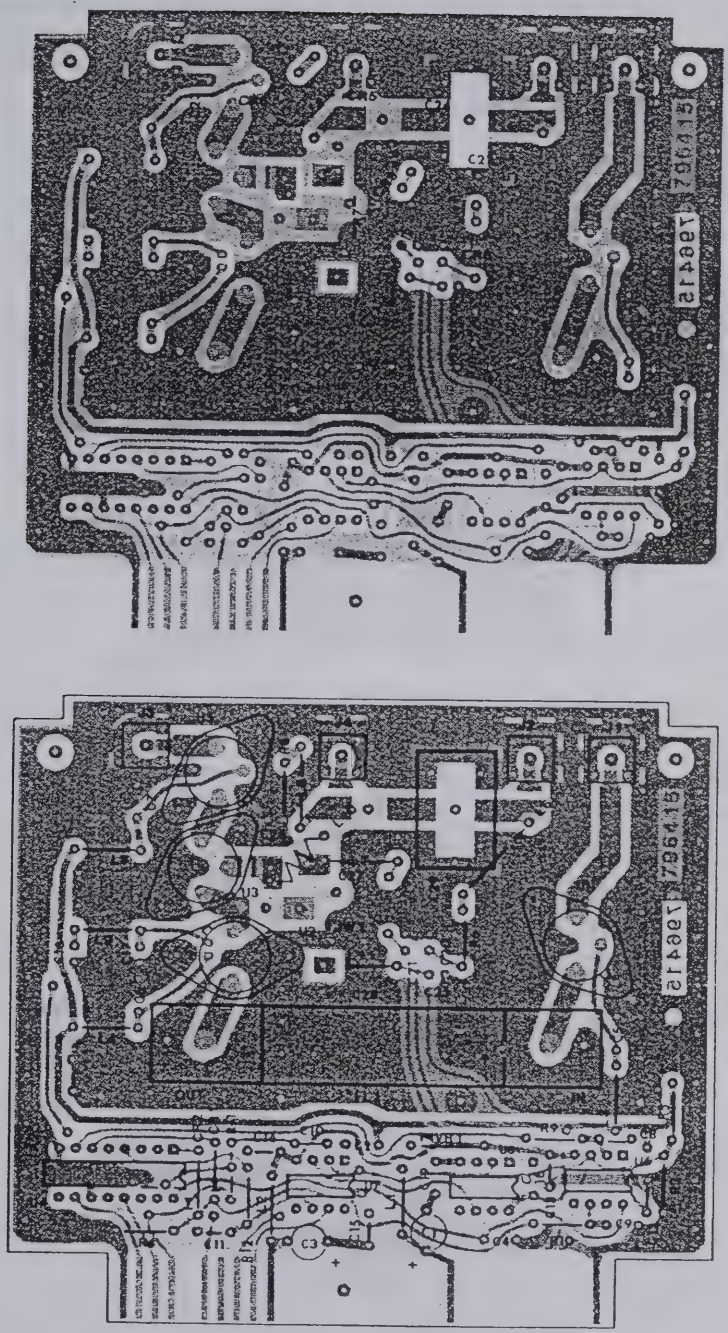


**Figure I-6. Type 796415-3, Preamplifier/Mixer (A3A1A2), Location of Components**

REF DESIG PREFIX **A3A1A2**

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| L10 | Coil, Fixed | 1 | 170189-1 | 14632 | |
| L11 | Same as L7 | | | | |
| R1 | Not Used | | | | |
| R2 | Not Used | | | | |
| R3 | Resistor, Fixed, Film: 1.8 kΩ, 5%, 1/8 W | 2 | CF1/8-1.8K/J | 09021 | |
| R4 | Resistor, Fixed, Film: 47 kΩ, 5%, 1/8 W | 1 | CF1/8-47K/J | 09021 | |
| R5 | Resistor, Fixed, Film: 12 kΩ, 5%, 1/8 W | 1 | CF1/8-12K/J | 09021 | |
| R6 | Resistor, Fixed, Film: 680Ω, 5%, 1/8 W | 2 | CF1/8-680 OHMS/J | 09021 | |
| R7 | Same as R6 | | | | |
| R8 | Resistor, Fixed, Film: 1.2Ω, 5%, 1/8 W | 1 | CF1/8-1.2K/J | 09021 | |
| R9 | Resistor, Fixed, Film: 18 kΩ, 5%, 1/8 W | 4 | CF1/8-18K/J | 09021 | |
| R10 Thru R12 | Same as R9 | | | | |
| R13 | Same as R3 | | | | |
| U1 | Amplifier | 1 | A12 | 14482 | |
| U2 | Attenuator | 1 | G1 | 14482 | |
| U3 | Mixer, Balanced | 1 | M2A | 14482 | |
| U4 | Integrated Circuit | 1 | CD4028AE | 02735 | |
| U5 | Amplifier | 1 | A28 | 14482 | |
| U6 | Integrated Circuit | 3 | LM358N | 27014 | |
| U7 | Same as U6 | | | | |
| U8 | Same as U6 | | | | |
| VR1 | Diode, Zener: 5.1 V | 1 | 1N751A | 80131 | |

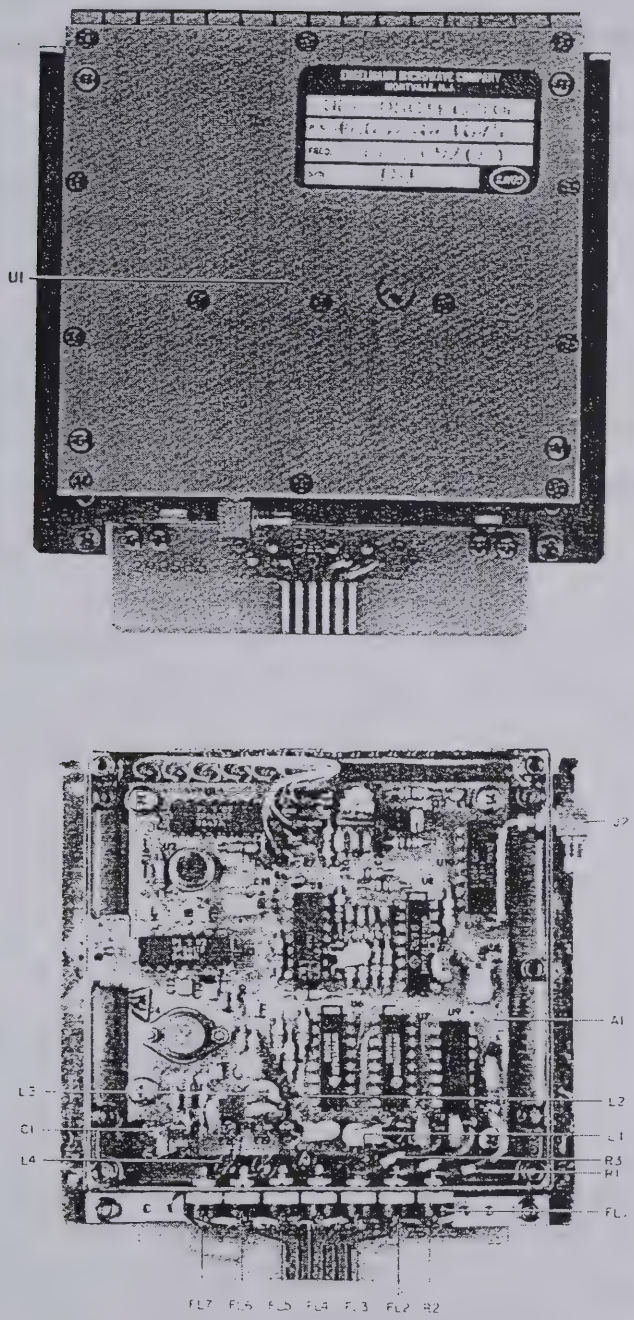



**Figure I-7. Type 798079-2 UHF LO Synthesizer (A3A1A3), Location of Components**

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| I.8.1.1.3 | **Type 798079-2 UHF LO Synthesizer** | | REF DESIG PREFIX **A3A1A3** | | |
| | Revision E1 | | | | |
| A1 | UHF Variable Divider | 1 | 390421-1 | 14632 | |
| A2 | UHF Oscillator Assembly | 1 | 796719-1 | 14632 | |
| C1 | Capacitor, Ceramic, Monolithic: 1.0 pF, 100 V | 1 | 100-100-NPO-109B | 51642 | |
| FB1 | Ferrite Bead | 12 | 56-590-65-4A | 02114 | |
| FB2 | | | | | |
| Thru | Same as FB1 | | | | |
| FB12 | | | | | |
| FL1 | Filter, Modified | 7 | 33728-18 | 14632 | |
| FL2 | | | | | |
| Thru | Same as FL1 | | | | |
| FL7 | | | | | |
| J1 | Not Used | | | | |
| J2 | Connector, Receptacle | 1 | 1012-1511-000 | 19505 | |
| L1 | Coil, Fixed | 4 | 16209-4 | 14632 | |
| L2 | | | | | |
| Thru | Same as L1 | | | | |
| L4 | | | | | |
| R1 | Resistor, Fixed, Film: 270Ω, 5%, 1/8 W | 3 | CF1/8-270 OHMS/J | 09021 | |
| R2 | Same as R1 | | | | |
| R3 | Same as R1 | | | | |
| R4 | Resistor, Fixed, Film: 100Ω, 5%, 1/8 W | 1 | CF1/8-100 OHMS/J | 09021 | |

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|

## I.8.1.1.3.1 *Type 390421-1 UHF Variable Divider* REF DESIG PREFIX **A3A1A3A1**

| | | | | |
|---|---|---|---|---|
| | Revision R1 | | | |
| C1 | Capacitor, Ceramic, Disc: 470 pF, 10%, 1000 V | 7 | CK05BX471K | 81349 |
| C2 | Same as C1 | | | |
| C3 | Same as C1 | | | |
| C4 | Capacitor, Ceramic, Disc: 0.01µF, 20%, 50 V | 6 | 34453-1 | 14632 |
| C5 Thru C7 | Same as C4 | | | |
| C8 | Capacitor, Electrolytic, Tantalum: 4.7µF, 20%, 35 V | 5 | 196D475X0035JE3 | 56289 |
| C9 | Same as C8 | | | |
| C10 | Capacitor, Ceramic, Disc: 0.1µF, 20%, 50 V | 1 | 34475-1 | 14632 |
| C11 | Capacitor, Ceramic, Chip: 470 pF, 10%, 100 V | 9 | C1210C471K1GAC | 31433 |
| C12 Thru C18 | Same as C11 | | | |
| C19 | Capacitor, Ceramic, Disc: 0.47µF, 20%, 50 V | 2 | 34452-1 | 14632 |
| C20 | Same as C8 | | | |
| C21 | Same as C19 | | | |
| C22 | Same as C4 | | | |
| C23 | Same as C1 | | | |
| C24 | Capacitor, Electrolytic, Tantalum: 22µF, 20%, 10 V | 1 | 196D226X0010JE3 | 56289 |
| C25 | Same as C1 | | | |
| C26 | Same as C8 | | | |
| C27 | Same as C8 | | | |
| C28 | Same as C1 | | | |
| C29 | Same as C1 | | | |
| C30 | Same as C4 | | | |
| C31 | Same as C11 | | | |
| CR1 | Diode | 1 | GC4211-15 | 50101 |
| L1 | Inductor, Air Core | 1 | 22292-170 | 14632 |
| Q1 | Transistor | 2 | 2N3904 | 80131 |
| Q2 | Same as Q1 | | | |
| R1 R2 Thru R6 | Same as R1 | | | |
| R7 | Resistor, Fixed, Film: 27Ω, 5%, 1/4 W | 1 | CF1/4-27 OHMS/J | 09021 |
| R8 | Resistor, Fixed, Film: 100Ω, 5%, 1/4 W | 2 | CF1/4-100 OHMS/J | 09021 |
| R9 | Resistor, Fixed, Film: 68Ω, 5%, 1/8 W | 1 | CF1/8-68 OHMS/J | 09021 |
| R10 | Resistor, Fixed, Film: 47Ω, 5%, 1/8 W | 1 | CF1/8-47 OHMS/J | 09021 |
| R11 | Resistor, Fixed, Film: 100Ω, 5%, 1/8 W | 1 | CF1/8-100 OHMS/J | 09021 |
| R12 | Resistor, Fixed, Film: 1.0 kΩ, 5%, 1/4 W | 2 | CF1/4-1K/J | 09021 |
| R13 | Resistor, Fixed, Film: 15 kΩ, 5%, 1/4 W | 1 | CF1/4-15K/J | 09021 |

REF DESIG PREFIX **A3A1A3A1**

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| R14 | Resistor, Fixed, Film: 3.6 kΩ, 5%, 1/4 W | 1 | CF1/4-3.6K/J | 09021 | |
| R15 | Resistor, Fixed, Film: 1.5 kΩ, 5%, 1/4 W | 1 | CF1/4-1.5K/J | 09021 | |
| R16 | Not Used | | | | |
| R17 | Resistor, Fixed, Film: 330Ω, 5%, 1/4 W | 1 | CF1/4-330 OHMS/J | 09021 | |
| R18 | Same as R12 | | | | |
| R19 | Resistor, Trimmer, Film: 2 kΩ, 10%, 1/2 W | 1 | 62PAR2K | 73138 | |
| R20 | Resistor, Fixed, Film: 3.3 kΩ, 5%, 1/4 W | 1 | CF1/4-3.3K/J | 09021 | |
| R21 | Same as R1 | | | | |
| R22 | Resistor, Fixed, Film: 4.7 kΩ, 5%, 1/4 W | 1 | CF1/4-4.7K/J | 09021 | |
| R23 | Same as R8 | | | | |
| R24 | Resistor, Fixed, Film: 4.7 MΩ, 5%, 1/4 W | 1 | CF1/4-4.7M/J | 09021 | |
| R25 | Resistor, Fixed, Film: 180Ω, 5%, 1/8 W | 1 | CF1/8-180 OHMS/J | 09021 | |
| RA1 | Heatsink, Integrated Circuit | 1 | 290509-1 | 14632 | |
| U1 | Integrated Circuit | 1 | SP8695B/DG | 52648 | |
| U2 | Integrated Circuit | 1 | SP8602B/CM | 52648 | |
| U3 | Integrated Circuit | 1 | SP8611B/DG | 52648 | |
| U4 | Amplifier | 1 | GPD-410 | 24539 | |
| U5 | Integrated Circuit | 1 | HA1-4741-5 | 34371 | |
| U6 | Integrated Circuit | 2 | SN74LS161AN | 01295 | |
| U7 | Same as U6 | | | | |
| U8 | Integrated Circuit | 1 | SN74LS138N | 01295 | |
| U9 | Integrated Circuit | 1 | SN74LS04N | 01295 | |
| U10 | Integrated Circuit | 1 | MC4044P | 04713 | |

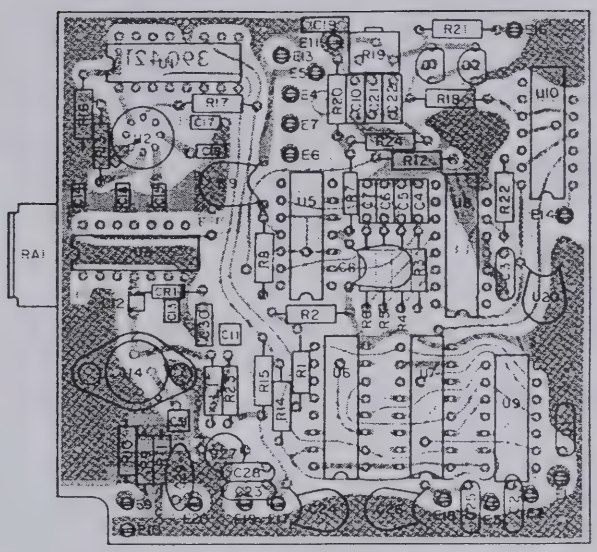



**Figure I-8. Type 390421-1 UHF Variable Divider (A3A1A3A1), Location of Components**

I.8.1.1.3.2 ***Type 796719-1 UHF Oscillator Assembly*** REF DESIG PREFIX **A3A1A3A2**

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| | Revision A | | | | |
| A1 | UHF Oscillator PC Assembly | 1 | 381473-1 | 14632 | |
| C1 | Capacitor, Feedthru: 1000 pF, 100 V | 6 | 54-790-018 | 33095 | |
| C2 Thru C6 | Same as C1 | | | | |
| J1 | Connector, Receptacle | 1 | 1012-1511-000 | 19505 | |
| R1 | Resistor, Fixed, Film: 22 kΩ, 5%, 1/8 W | 4 | CF1/8-22K/J | 09021 | |
| R2 Thru R4 | Same as R1 | | | | |

### I.8.1.1.3.2.1 Type 381473-1 UHF Oscillator PC Assembly — REF DESIG PREFIX A3A1A3A2A1

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| | Revision A | | | | |
| C1 | P/O PC Board | 4 | | | |
| C2 | Capacitor, Ceramic: 1.5 pF,±.1 pF, 500 V | 3 | ATC175B1R5BP500X | 29990 | |
| C3 | Capacitor, Variable, Air: .4-2.5 pF, 500 V | 4 | 27283 | 91293 | |
| C4 | Capacitor, Ceramic: 5.6 pF,±.1 pF, 500 V | 2 | ATC175B5R6BP500X | 29990 | |
| C5 | Same as C1 | | | | |
| C6 | Same as C2 | | | | |
| C7 | Same as C3 | | | | |
| C8 | Same as C4 | | | | |
| C9 | Same as C1 | | | | |
| C10 | Same as C2 | | | | |
| C11 | Same as C3 | | | | |
| C12 | Capacitor, Ceramic: 4.7 pF,±.1 pF, 500 V | 1 | ATC175B4R7BP500X | 29990 | |
| C13 | Same as C1 | | | | |
| C14 | Capacitor Ceramic: 1.0 pF,±.1 pF, 500 V | 1 | ATC175B1R0BP500X | 29990 | |
| C15 | Same as C3 | | | | |
| C16 | Capacitor, Ceramic: 3.9 pF,±.1 pF, 500 V | 1 | ATC175B3R9BP500X | 29990 | |
| C17 | Capacitor, Electrolytic, Tantalum: 22µF, 20%, 15 V | 1 | TMM-S-226M-015R | 04222 | |
| C18 | Capacitor, Ceramic, Monolithic: 2.0 pF,±.1 pF, 100 V | 2 | 100-100-NPO-209B | 51642 | |
| C19 | Capacitor, Ceramic, Monolithic: 2.4 pF,±.1 pF, 100 V | 1 | 100-100-NPO-249B | 51642 | |
| C20 | Capacitor, Ceramic, Monolithic: 1.0 pF,±.1 pF, 100 V | 2 | 100-100-NPO-109B | 51642 | |
| C21 | Same as C20 | | | | |
| C22 | Same as C18 | | | | |
| C23 | Capacitor, Ceramic, Disk: .01µF, 20%, 50 V | 1 | 34453-1 | 14632 | |
| CR1 | Tuning Varactor | 4 | MA-45240-31 | 96341 | |
| CR2 thru CR4 | Same as CR1 | | | | |
| CR5 | Diode | 1 | IN4449 | 80131 | |
| FB1 | Ferrite Bead | 12 | 56-590-65-4A | 02114 | |
| FB2 thru FB12 | Same as FB1 | | | | |
| L1 | Coil, Fixed | 9 | 190187-1 | 14632 | |
| L2 thru L9 | Same as L1 | | | | |
| L10 | Coil, Fixed | 3 | 180683-1 | 14632 | |
| L11 | Same as L10 | | | | |
| L12 | Same as L10 | | | | |
| Q1 | Transistor | 4 | MMBT2222A | 04713 | |
| Q2 | Transistor | 4 | 841269 | 14632 | |
| Q3 | Same as Q2 | | | | |
| Q4 | Same as Q1 | | | | |

REF DESIG PREFIX **A3A1A3A2A1**

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| Q5 | Same as Q2 | | | | |
| Q6 | Same as Q1 | | | | |
| Q7 | Same as Q2 | | | | |
| Q8 | Same as Q1 | | | | |
| Q9 | Transistor | 1 | MMBT3906 | 04713 | |
| R1 | Resistor, Fixed, Film: 1.8 kΩ, 5%, 1/8 W | 6 | C3-1.8K-5PCT | 24546 | |
| R2 | Resistor, Fixed, Film: 130Ω, 5%, 1/4 W | 1 | CF1/4-130 OHMS/J | 09021 | |
| R3 | Same as R1 | | | | |
| R4 | Resistor, Fixed, Film: 150Ω, 5%, 1/4 W | 1 | CF1/4-150 OHMS/J | 09021 | |
| R5 | Same as R1 | | | | |
| R6 | Resistor, Fixed, Film: 180Ω, 5%, 1/4 W | 1 | CF1/4-180 OHMS/J | 09021 | |
| R7 | Same as R1 | | | | |
| R8 | Resistor, Fixed, Film: 110Ω, 5%, 1/8 W | 1 | CF1/4-110 OHMS/J | 09021 | |
| R9 | Same as R1 | | | | |
| R10 | Resistor, Fixed, Film: 3.3K, 5%, 1/8 W | 1 | C3-3.3K-5PCT | 24546 | |
| R11 | Same as R1 | | | | |
| R12 | Resistor, Fixed, Film: 18 kΩ, 5%, 1/8 W | 1 | C3-18K-5PCT | 24546 | |
| R13 | Not Used | | | | |
| R14 | Resistor, Fixed, Film: 100Ω, 5%, 1/8 W | 2 | C3-100R-5PCT | 24546 | |
| R15 | Same as R14 | | | | |
| T1 | Power Divider | 2 | 281926-1 | 14632 | |
| T2 | Same as T1 | | | | |

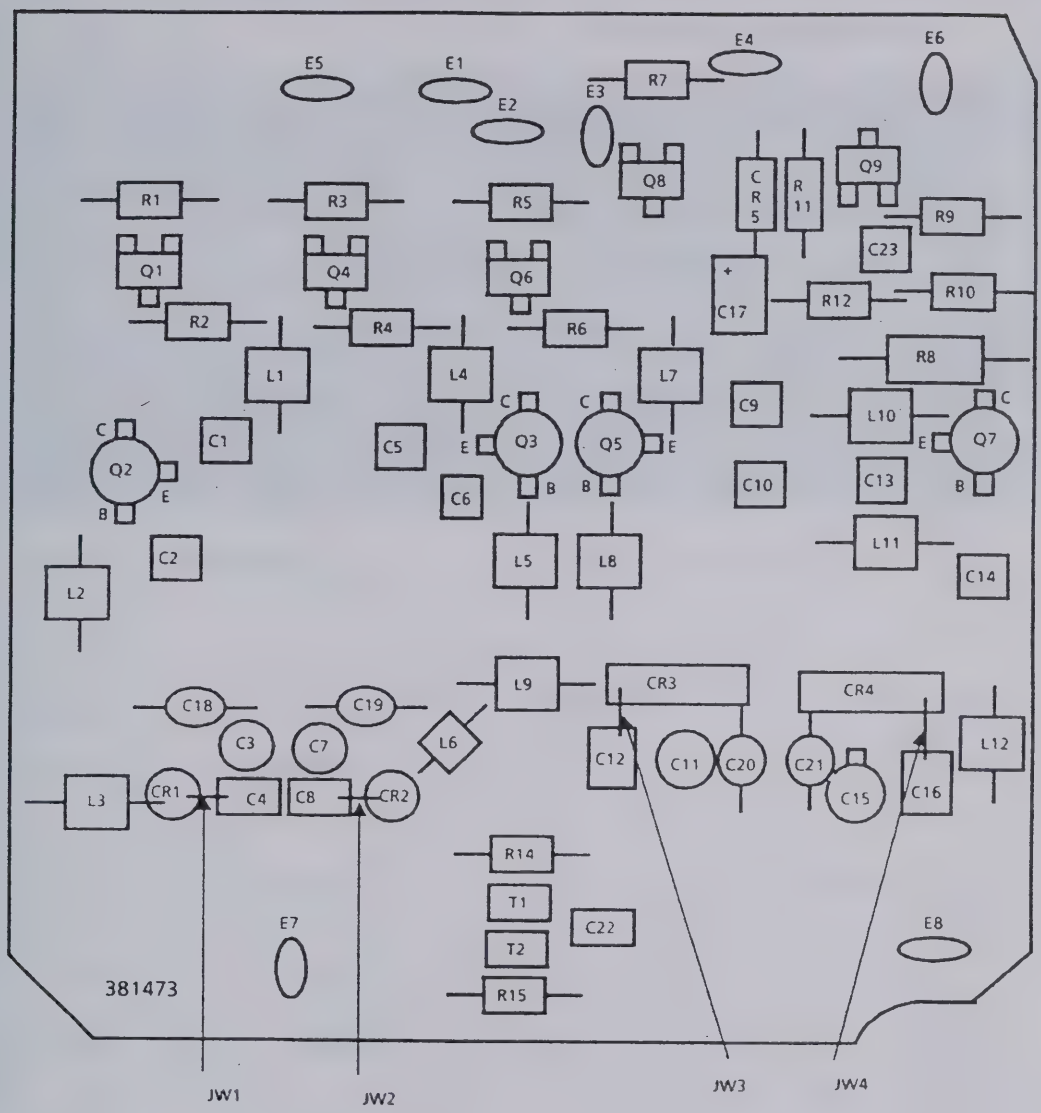



**Figure I-9. Type 381473-1 UHF Oscillator PC Assembly (A3A1A3A2A1), Location of Components**

| REF DESIG | DESCRIPTION | QTY PER ASSY | MANUFACTURERS PART NO. | MFR. CODE | RECM VENDOR |
|---|---|---|---|---|---|
| I.8.2 | **TYPE 280899-3 RF SWITCH** | | | REF DESIG PREFIX **A3A2** | |
| | Revision C | | | | |
| C1 | Capacitor, Ceramic, Chip: 4.3 pF,±0.5 pF, 500 V | 2 | ATC700B4R3DP500X | 29990 | |
| C2 | Capacitor, Ceramic, Chip: 2200 pF, 5%, 50 V | 2 | C1005C222J5GAC | 31433 | |
| C3 | Capacitor, Ceramic, Chip: 0.05µF, 10%, 50 V | 2 | 1210-050-X7R-503KS | 55969 | |
| C4 | Capacitor, Ceramic, Chip: 8.2 pF,±0.25 pF, 500 V | 2 | ATC700B8R2CP500X | 29990 | |
| C5 | Same as C1 | | | | |
| C6 | Capacitor, Ceramic, Disc: 1000 pF, 10%, 100 V | 2 | 8121-100-X7R0-102K | 59660 | |
| C7 | Same as C3 | | | | |
| C8 | Same as C6 | | | | |
| C9 | Same as C2 | | | | |
| C10 | Capacitor, Ceramic, Chip: 13 pF, 2%, 500 V | 1 | ATC700B130GP500X | 29990 | |
| C11 | Capacitor, Ceramic, Chip: 10 pF, 2%, 500 V | 1 | ATC700B100GP500X | 29990 | |
| C12 | Capacitor, Ceramic, Chip: 4.7 pF,±0.25 pF, 500 V | 1 | ATC700B4R7CP500X | 29990 | |
| C13 | Capacitor, Ceramic, Chip: 33 pF, 2%, 500 V | 1 | ATC700B330GP500X | 29990 | |
| C14 | Same as C4 | | | | |
| C15 | Capacitor, Ceramic, Chip: 0.5 pF,±0.1 pF, 500 V | 1 | ATC100B0R5BP500X | 29990 | |
| CR1 | Diode | 5 | 841320 | 14632 | |
| CR2 | | | | | |
| Thru | Same as CR1 | | | | |
| CR5 | | | | | |
| E1 | Terminal, Forked | 2 | 140-1941-02-01 | 71279 | |
| E2 | Same as E1 | | | | |
| FB1 | Ferrite Bead | 6 | 56-590-65-4A | 02114 | |
| FB2 | | | | | |
| Thru | Same as FB1 | | | | |
| FB6 | | | | | |
| J1 | Connector, Receptacle | 2 | 1110-7511-000 | 19505 | |
| J2 | Not Used | | | | |
| J3 | Same as J1 | | | | |
| L1 | Coil, Fixed | 2 | 170160-1 | 14632 | |
| L2 | Same as L1 | | | | |
| L3 | Coil, Fixed | 3 | 170134-1 | 14632 | |
| L4 | Same as L3 | | | | |
| L5 | Same as L3 | | | | |
| L6 | Coil, Fixed | 1 | 170158-1 | 14632 | |
| L7 | Coil, Fixed | 1 | 170159-1 | 14632 | |
| R1 | Resistor, Fixed, Composition: 560Ω, 5%, 1/8 W | 2 | RCR05G561JS | 81349 | |
| R2 | Resistor, Fixed, Composition: 680Ω, 5%, 1/4 W | 1 | RCR07G681JS | 81349 | |
| R3 | Same as R1 | | | | |

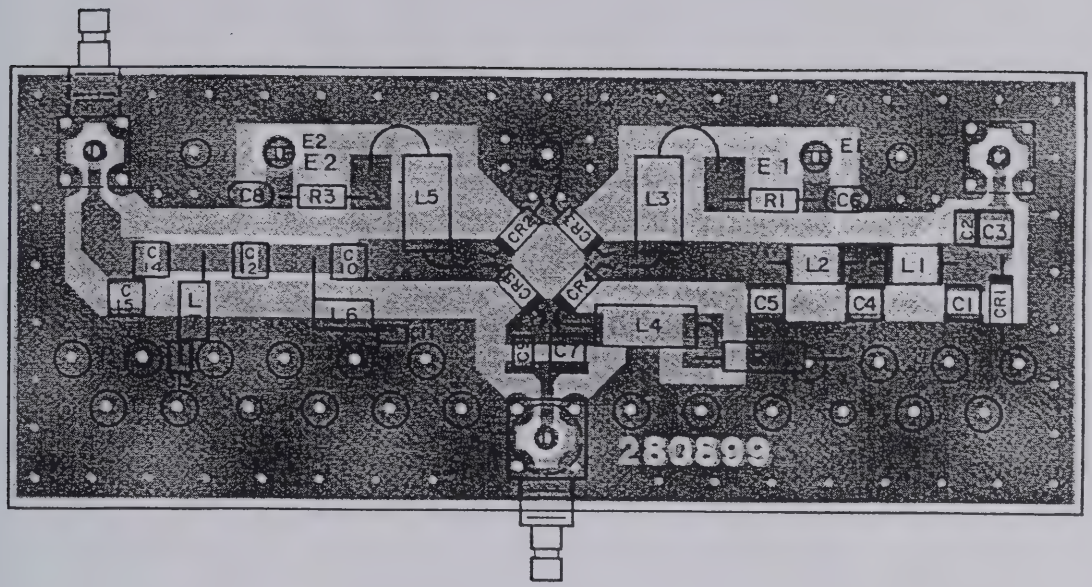
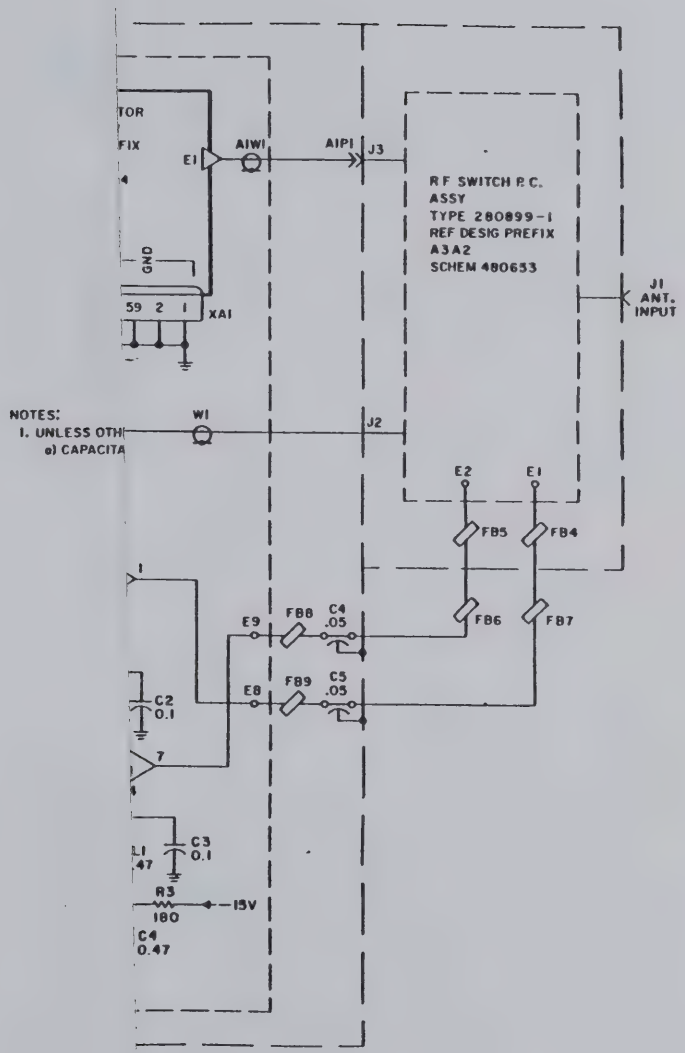



**Figure I-10. Type 280899-3 RF Switch (A3A2), Location of Components**

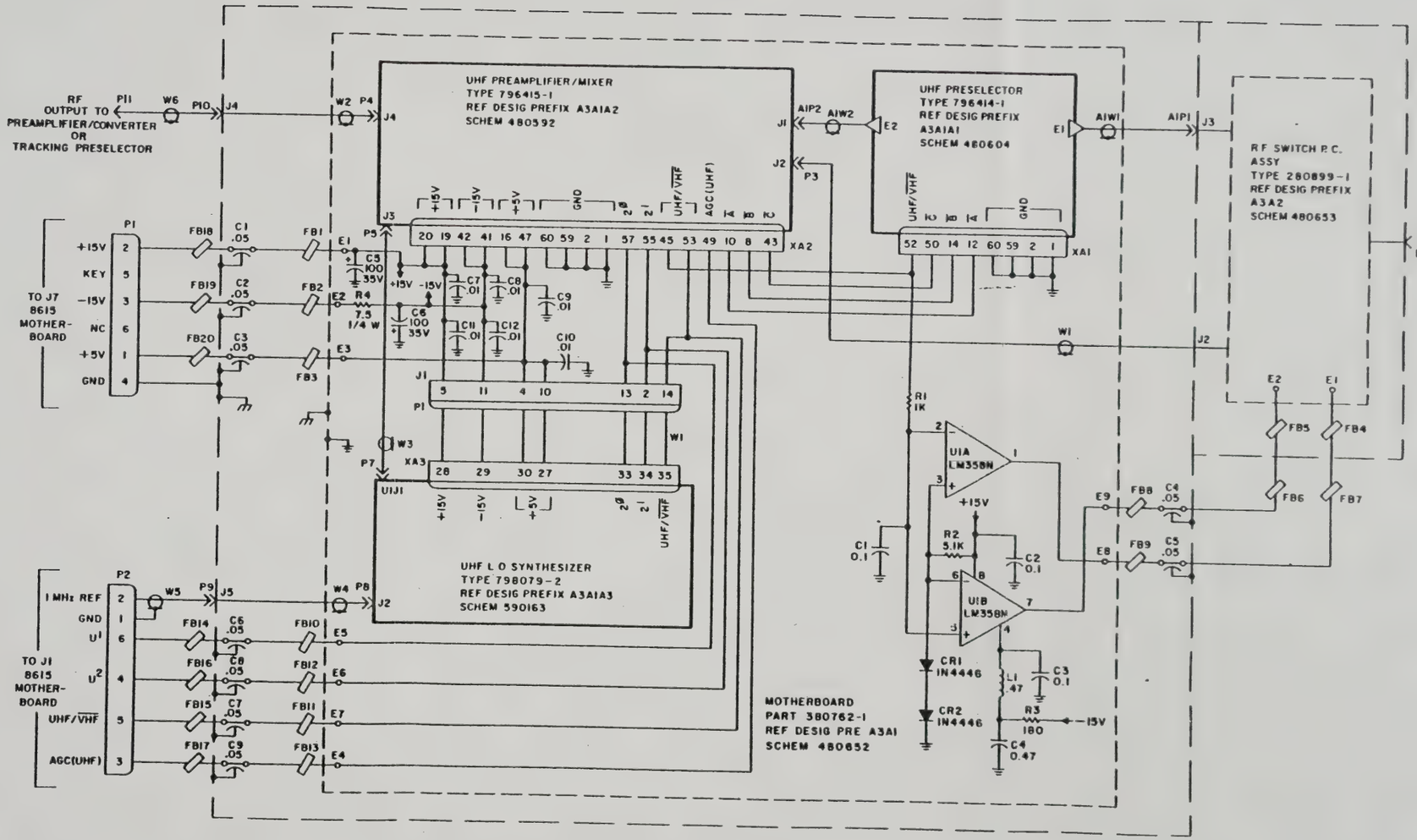
**NOTES**




O-I-1. Type 380762-1 Motherboard (A3A1), Schematic Diagram 480651

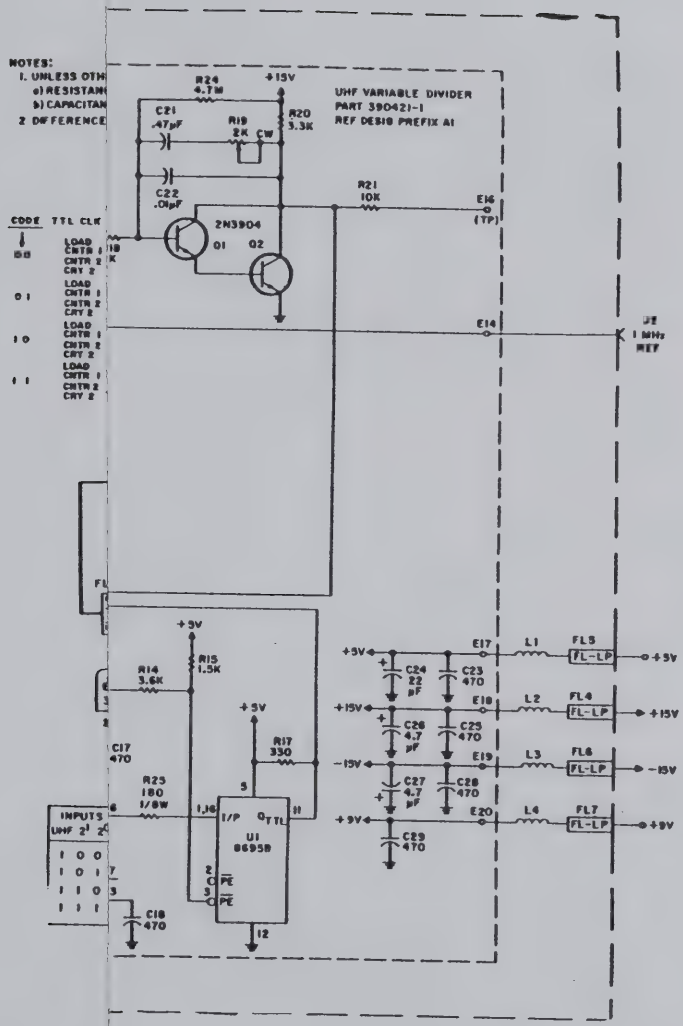
FP-I-1/(FP-I-2 blank)

**NOTES**


RF OUTPUT TO PREAMPLIFIER/CONVERTER OR TRACKING PRESELECTOR
UHF PREAMPLIFIER/MIXER TYPE 796415-1 REF DESIG PREFIX A3A1A2 SCHEM 480592
UHF PRESELECTOR TYPE 796414-1 REF DESIG PREFIX A3A1A1 SCHEM 480604
RF SWITCH P.C. ASSY TYPE 280899-1 REF DESIG PREFIX A3A2 SCHEM 480653
J1 ANT. INPUT
TO J7 8615 MOTHER-BOARD
UHF L O SYNTHESIZER TYPE 798079-2 REF DESIG PREFIX A3A1A3 SCHEM 590163
TO J1 8615 MOTHER-BOARD
MOTHERBOARD PART 380762-1 REF DESIG PRE A3A1 SCHEM 480652
UIA LM358N
UIB LM358N
+15V
KEY
-15V
NC
+5V
GND
1 MHz REF
UHF/VHF
AGC(UHF)

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) CAPACITANCE IS IN μF.

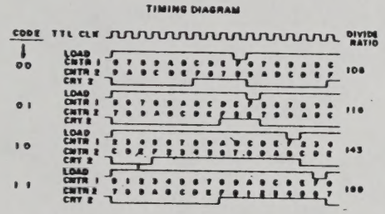
FO-I-1. Type 380762-1 Motherboard (A3A1), Schematic Diagram 480651




Type 798079-2 UHF LO Synthesizer (A3A1A3),
Schematic Diagram 590163

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS IN pF.
2 DIFFERENCE BETWEEN TYPES IS MECHANICAL ONLY

TIMING DIAGRAM




DETAIL A
WIRING TO CONNECTOR

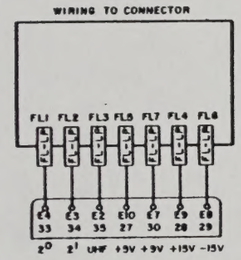
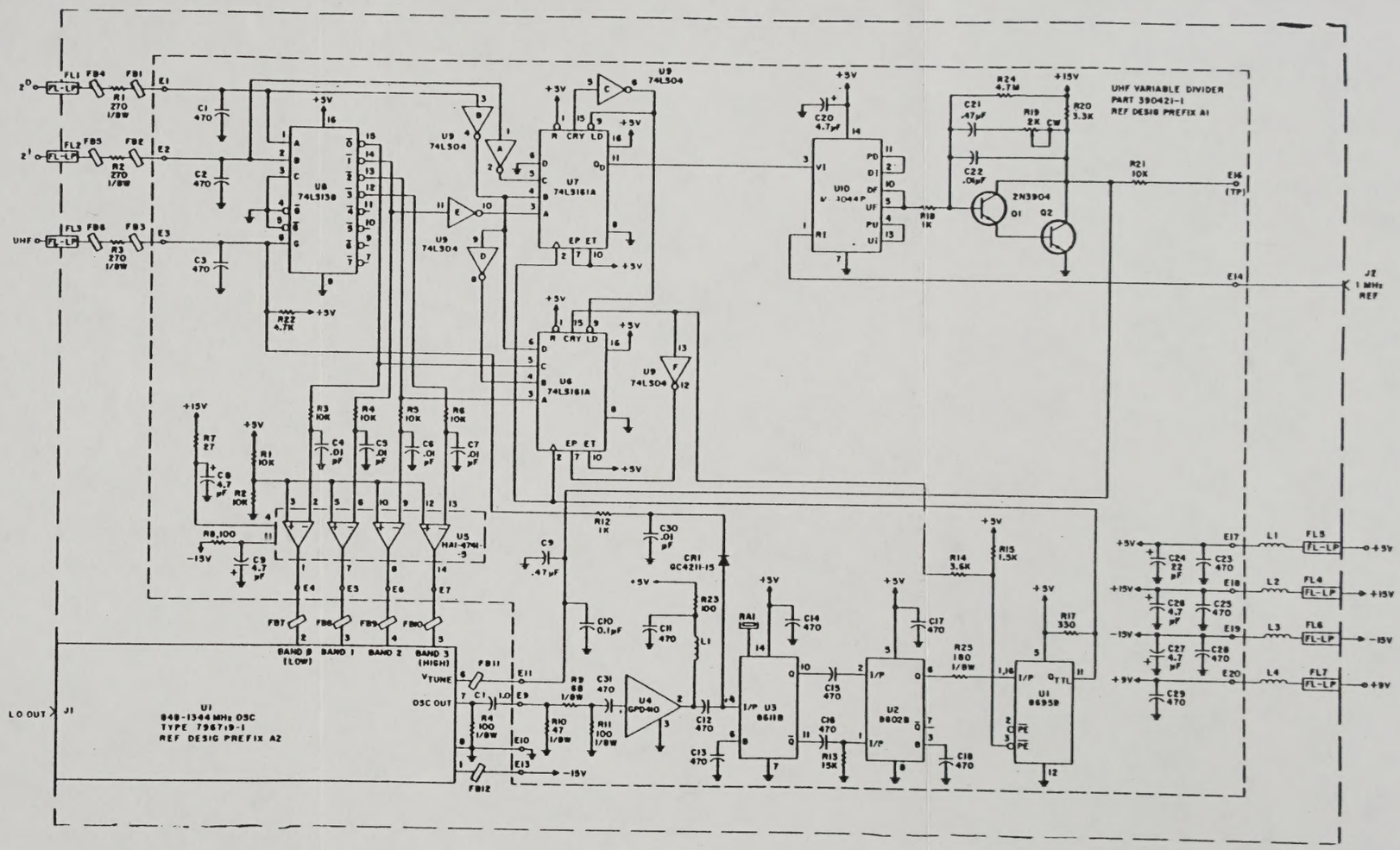



TABLE I

| INPUTS UHF Z1 Z0 | | CONTR 1 D C B A | CONTR 2 D C B A |
|---|---|---|---|
| 1 0 0 | → | 0 1 1 0 | 1 0 0 1 |
| 1 0 1 | → | 0 1 0 1 | 0 1 1 1 |
| 1 1 0 | → | 0 0 1 0 | 1 1 0 0 |
| 1 1 1 | → | 0 0 0 0 | 0 1 1 1 |




FO-I-4. Type 798079-2 UHF LO Synthesizer (A3A1A3), Schematic Diagram 590163

BAE SYSTEMS